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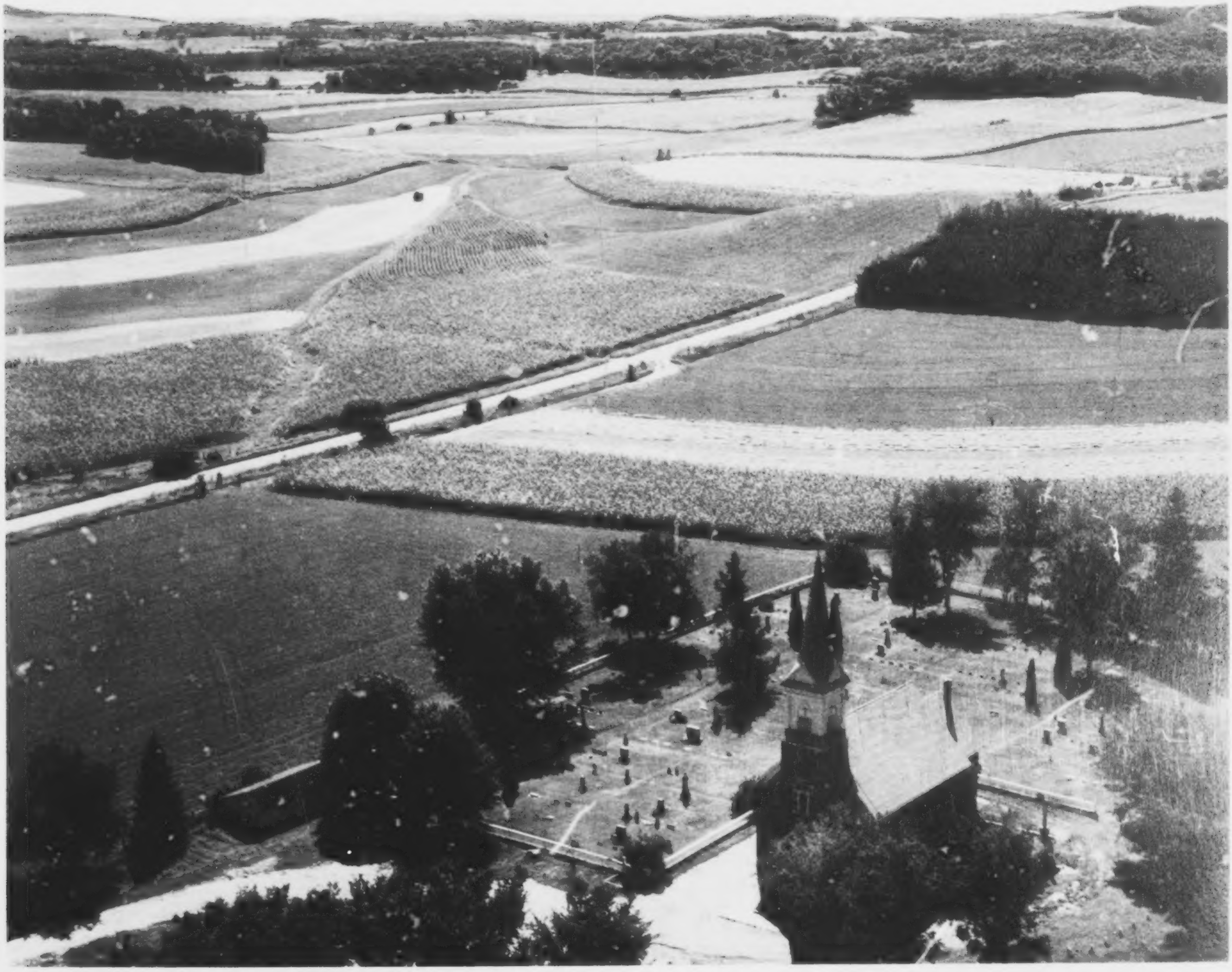
United States
Department of
Agriculture

Soil
Conservation
Service

In cooperation with
the Research Division of the
College of Agricultural and
Life Sciences, University
of Wisconsin

Soil Survey of Chippewa County, Wisconsin



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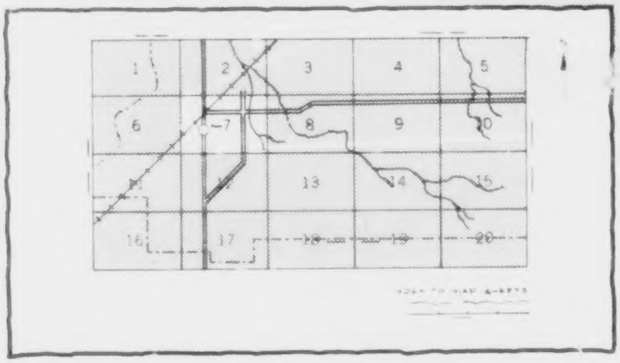
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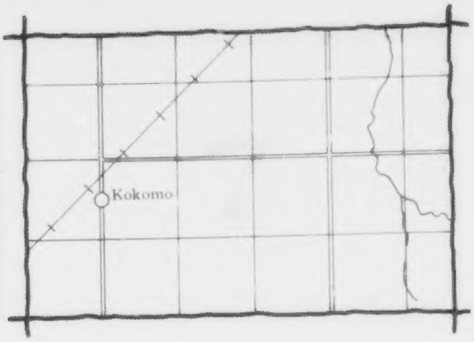

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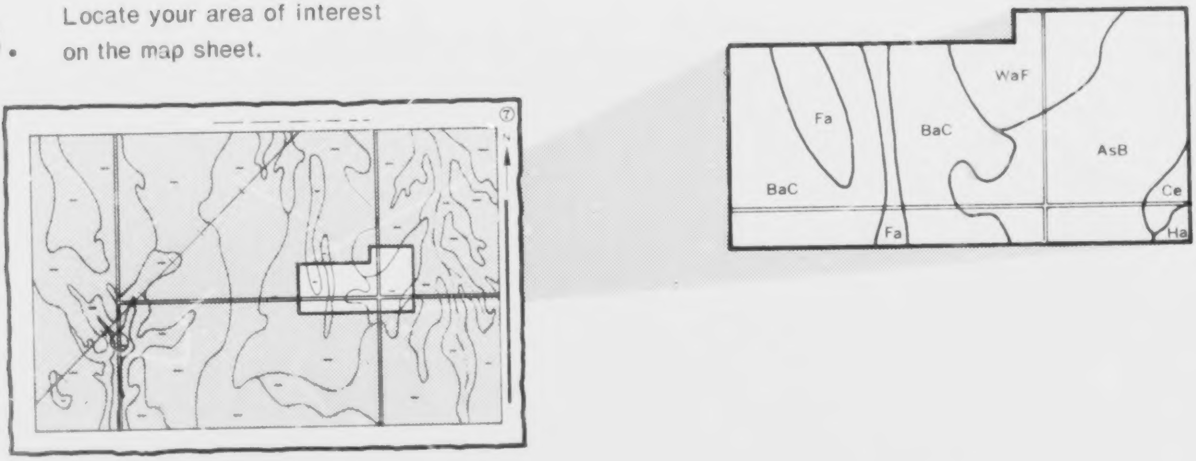
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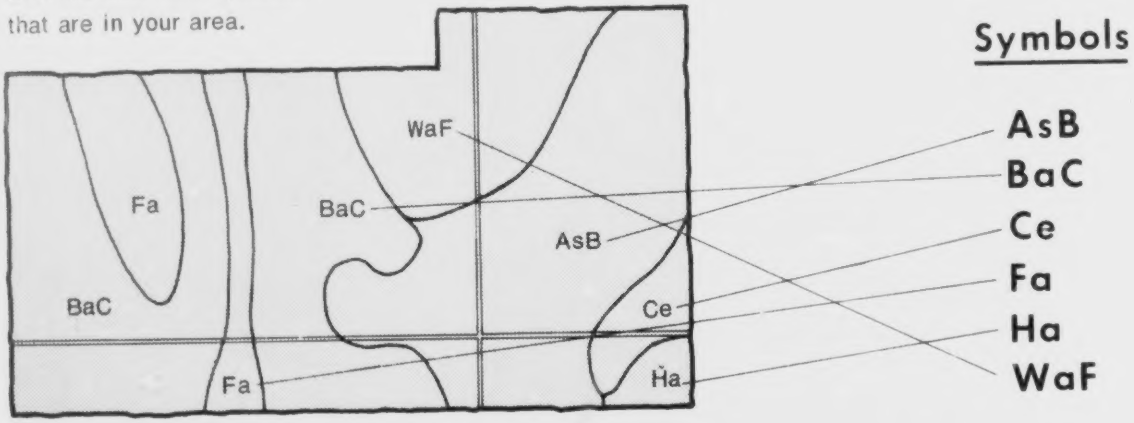
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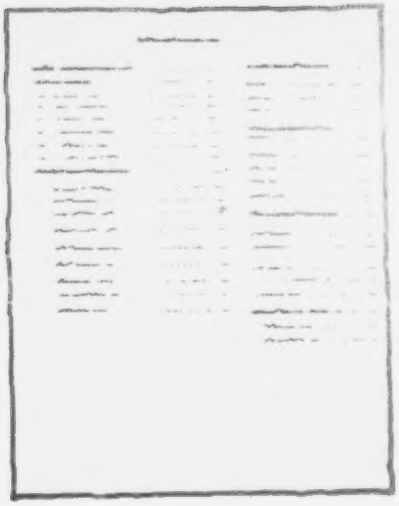
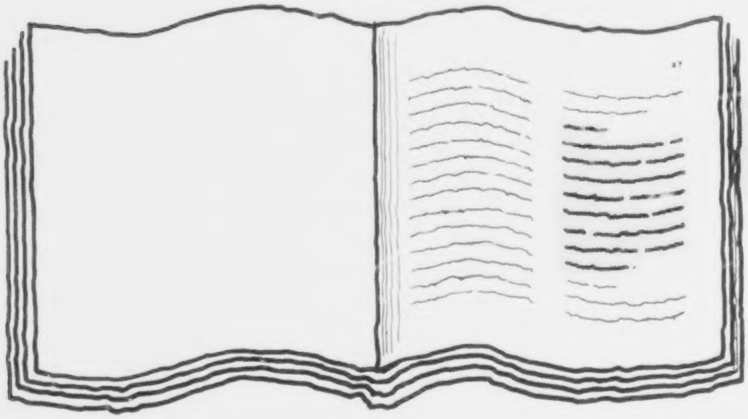
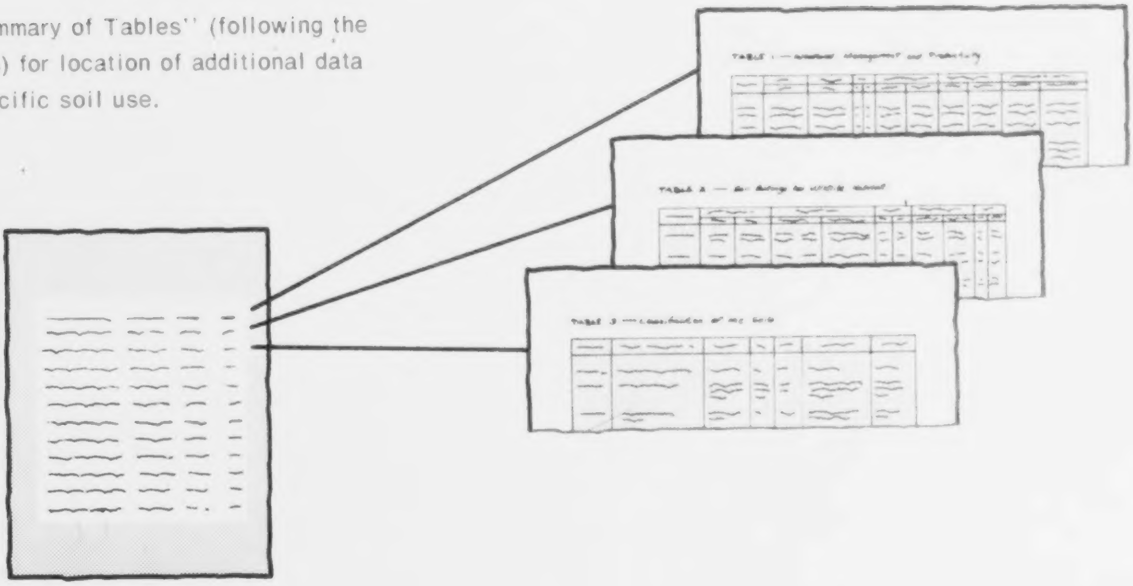
THIS SOIL SURVEY

5. Turn to "Index to Soil Map Units" which lists the name of each map unit and the page where that map unit is described.





6. See "Summary of Tables" (following the Contents) for location of additional data on a specific soil use.



7. Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; to specialists in wildlife management, waste disposal, or pollution control.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, handicap, or age.

Major fieldwork for this soil survey was completed in 1984. Soil names and descriptions were approved in 1985. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1985. This survey was made cooperatively by the Soil Conservation Service and the Research Division of the College of Agricultural and Life Sciences, University of Wisconsin. It is part of the technical assistance furnished to the Chippewa County Land Conservation Committee, which helped to finance the fieldwork.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

Cover: Contour strips of corn, oats, and alfalfa on Billett and Northfield soils. Contour stripcropping is an important erosion-control measure in Chippewa County.

Contents

Index to map units ... v
Summary of tables ... vii
Foreword ... ix
General nature of the county ... 1
How this survey was made ... 3
  Map unit composition ... 4
General soil map units ... 5
  Soil descriptions ... 5
Detailed soil map units ... 13
  Soil descriptions ... 13
Prime farmland ... 99
Use and management of the soils ... 101
  Crops and pasture ... 101
  Woodland management and productivity ... 104
  Windbreaks and environmental plantings ... 106
  Recreation ... 106
  Wildlife habitat ... 107
  Engineering ... 109
Soil properties ... 115
  Engineering index properties ... 115
  Physical and chemical properties ... 116
  Soil and water features ... 117
  Engineering index test data ... 119
Classification of the soils ... 121
Soil series and their morphology ... 121
Formation of the soils ... 157
  Geology and underlying material ... 157
  Factors of soil formation ... 157
  Processes of soil formation ... 158
References ... 161
Glossary ... 163
Tables ... 169

Soil Series

Alban series ... 121
Almena series ... 122
Amery series ... 123
Antigo series ... 124
Arenzville series ... 124
Arland series ... 124
Auburndale series ... 125
Barronett series ... 125
Beseman series ... 126
Billett series ... 126
Boone series ... 127
Brill series ... 127
Burkhardt series ... 128
Cable series ... 128
Campia series ... 128
Caryville series ... 129
Chetek series ... 129
Comstock series ... 130
Crystal Lake series ... 130
Eleva series ... 131
Elkmound series ... 131
Elm Lake series ... 132
Fallcreek series ... 132
Flambeau series ... 133
Fordum series ... 134
Freeon series ... 134
Friendship series ... 135
Gale series ... 135
Greenwood series ... 136
Halder series ... 136
Hiles series ... 136
Hiles Variant ... 137
Hixton series ... 137
Humbird series ... 138
Kert series ... 138
Lows series ... 139
Loyal series ... 139
Lupton series ... 140
Magnor series ... 140
Mahtomedi series ... 141
Markey series ... 141
Meehan series ... 142
Menahga series ... 142
Meridian series ... 142
Merrillan series ... 143
Minocqua series ... 143
Moundville series ... 144
Newson series ... 144
Northfield series ... 144
Oesterle series ... 145
Orion series ... 145
Otterholt series ... 146
Plainbo series ... 146
Plover series ... 146

Poskin series 147
Rib series 148
Richford series 148
Rosholt series 149
Santiago series 150
Sattre series 150
Scott Lake series 151
Seaton series 151
Seelyeville series 151
Shiffer series 152
Spencer series 152
Tell series 153
Vesper series 153
Warman Variant 154
Withee series 154

Issued June 1989

Index to Map Units

AfB—Alban fine sandy loam, 2 to 6 percent slopes... 13
AfC—Alban fine sandy loam, 6 to 12 percent slopes 14
AgB—Almena silt loam, 1 to 6 percent slopes............ 15
AlB—Amery sandy loam, 2 to 6 percent slopes 16
AlC—Amery sandy loam, 6 to 12 percent slopes....... 16
AlD—Amery sandy loam, 12 to 25 percent slopes..... 17
AlF—Amery sandy loam, 25 to 45 percent slopes 18
AnB—Antigo silt loam, 1 to 6 percent slopes............. 18
AnC2—Antigo silt loam, 6 to 12 percent slopes, eroded.......... 19
AoA—Arenzville silt loam, 0 to 3 percent slopes........ 19
ApB—Arland sandy loam, 2 to 6 percent slopes........ 20
ApC2—Arland sandy loam, 6 to 12 percent slopes, eroded.......... 21
ApD2—Arland sandy loam, 12 to 20 percent slopes, eroded.......... 21
AsB—Arland loam, 2 to 6 percent slopes.................... 22
AsC2—Arland loam, 6 to 12 percent slopes, eroded. 23
AsD2—Arland loam, 12 to 20 percent slopes, eroded.......... 23
Au—Auburndale silt loam, 0 to 2 percent slopes........ 24
Ba—Barronett silt loam, 0 to 2 percent slopes........... 25
Bb—Barronett mucky silt loam, ponded, 0 to 2 percent slopes.......... 25
Be—Beseman muck, 0 to 1 percent slopes............... 26
BlA—Billett sandy loam, 0 to 2 percent slopes........... 26
BlB—Billett sandy loam, 2 to 6 percent slopes........... 27
BlC2—Billett sandy loam, 6 to 12 percent slopes, eroded.......... 27
BmA—Billett sandy loam, moderately well drained, 0 to 3 percent slopes.......... 28
BoE—Boone fine sand, 20 to 45 percent slopes........ 29
BpA—Brill silt loam, 0 to 3 percent slopes................. 29
BuA—Burkhardt sandy loam, 0 to 3 percent slopes .. 30
Cb—Cable silt loam, 0 to 2 percent slopes................ 31
CdB—Campia silt loam, 2 to 6 percent slopes 31
CdC2—Campia silt loam, 6 to 12 percent slopes, eroded.......... 32
CdD2—Campia silt loam, 12 to 20 percent slopes, eroded.......... 33
CeA—Caryville sandy loam, 0 to 3 percent slopes..... 33
CkA—Chetek sandy loam, 0 to 2 percent slopes....... 34
CkB—Chetek sandy loam, 2 to 6 percent slopes....... 34
CkC2—Chetek sandy loam, 6 to 12 percent slopes, eroded.......... 35
CkD2—Chetek-Mahtomedi complex, 12 to 25 percent slopes, eroded.......... 36
CkE—Chetek-Mahtomedi complex, 25 to 40 percent slopes.......... 37
Cm—Comstock silt loam, 0 to 2 percent slopes........ 37
CuA—Crystal Lake silt loam, 0 to 3 percent slopes... 38
ElB—Eleva sandy loam, 2 to 6 percent slopes 39
ElC2—Eleva sandy loam, 6 to 12 percent slopes, eroded.......... 39
ElD2—Eleva sandy loam, 12 to 20 percent slopes, eroded.......... 40
EmB—Elkmound loam, 2 to 6 percent slopes............ 41
EmC2—Elkmound loam, 6 to 12 percent slopes, eroded.......... 41
EmD2—Elkmound loam, 12 to 20 percent slopes, eroded.......... 42
EmE—Elkmound loam, 20 to 45 percent slopes 43
Eo—Elm Lake loamy sand, 0 to 2 percent slopes...... 43
FaB—Fallcreek sandy loam, 2 to 6 percent slopes.... 44
FbB—Flambeau loam, 2 to 6 percent slopes............. 45
FbC2—Flambeau loam, 6 to 12 percent slopes, eroded.......... 45
Fm—Fordum loam, 0 to 2 percent slopes 46
FnB—Freeon silt loam, 2 to 6 percent slopes............ 47
FnC2—Freeon silt loam, 6 to 12 percent slopes, eroded.......... 47
FrA—Friendship loamy sand, 0 to 3 percent slopes .. 48
GaB—Gale silt loam, 2 to 6 percent slopes 49
GaC2—Gale silt loam, 6 to 12 percent slopes, eroded.......... 50
GaD2—Gale silt loam, 12 to 20 percent slopes, eroded.......... 50
Gr—Greenwood peat, 0 to 1 percent slopes 51
Ha—Halder loam, 0 to 2 percent slopes..................... 52
HeB—Hiles silt loam, 2 to 6 percent slopes............... 52
HfB—Hiles Variant loam, 2 to 8 percent slopes 53
HnB—Hixton loam, 2 to 6 percent slopes 54
HnC2—Hixton loam, 6 to 12 percent slopes, eroded. 54
HuB—Humbird sandy loam, 2 to 6 percent slopes.... 55
HuC2—Humbird sandy loam, 6 to 12 percent slopes, eroded.......... 56
KeB—Kert silt loam, 1 to 6 percent slopes 57
La—Lows loam, 0 to 2 percent slopes...................... 58
LoB—Loyal silt loam, 2 to 6 percent slopes............... 59
LoC2—Loyal silt loam, 6 to 12 percent slopes, eroded.......... 59
Lp—Lupton muck, 0 to 1 percent slopes 60
MbB—Magnor silt loam, 1 to 6 percent slopes 61
McB—Magnor silt loam, 1 to 6 percent slopes, stony.......... 62
MdB—Mahtomedi loamy sand, 2 to 6 percent slopes.......... 63

MdC—Mahtomedi loamy sand, 6 to 12 percent slopes 64
Me—Markey muck, 0 to 1 percent slopes 64
Mh—Meehan loamy sand, 0 to 2 percent slopes 65
MkB—Menahga loamy sand, 0 to 6 percent slopes 66
MkC—Menahga loamy sand, 6 to 12 percent slopes 66
MlA—Meridian loam, 0 to 2 percent slopes 67
MlB—Meridian loam, 2 to 6 percent slopes 68
MmA—Meridian loam, moderately well drained, 0 to 3 percent slopes 68
MrB—Merrillan sandy loam, 1 to 6 percent slopes 69
Mu—Minocqua loam, 0 to 2 percent slopes 70
MvA—Moundville loamy sand, 0 to 3 percent slopes 70
Na—Newson loamy sand, 0 to 2 percent slopes 71
NtB—Northfield silt loam, 2 to 6 percent slopes 72
NtC2—Northfield silt loam, 6 to 12 percent slopes, eroded 72
NtD2—Northfield silt loam, 12 to 20 percent slopes, eroded 73
Oe—Oesterle sandy loam, 0 to 2 percent slopes 73
Or—Orion silt loam, 0 to 2 percent slopes 74
OsC2—Otterholt silt loam, 6 to 12 percent slopes, eroded 75
Pc—Pits, gravel 76
PdB—Plainbo loamy sand, 2 to 6 percent slopes 76
PdC—Plainbo loamy sand, 6 to 12 percent slopes 77
PdD—Plainbo loamy sand, 12 to 20 percent slopes 77
Pv—Plover silt loam, 0 to 2 percent slopes 78
Px—Poskin silt loam, 0 to 2 percent slopes 79
Rb—Rib silt loam, 0 to 2 percent slopes 79
Rc—Rib mucky silt loam, ponded, 0 to 2 percent slopes 80
RfA—Richford loamy sand, 0 to 3 percent slopes 81
RoA—Rosholt sandy loam, 0 to 2 percent slopes 81
RoB—Rosholt sandy loam, 2 to 6 percent slopes 82
RoC2—Rosholt sandy loam, 6 to 12 percent slopes, eroded 82
RpA—Rosholt loam, 0 to 2 percent slopes 83
RpB—Rosholt loam, 2 to 6 percent slopes 84
RpC2—Rosholt loam, 6 to 12 percent slopes, eroded 84
SaB—Santiago silt loam, 2 to 6 percent slopes 85
SaC2—Santiago silt loam, 6 to 12 percent slopes, eroded 85
SaD2—Santiago silt loam, 12 to 20 percent slopes, eroded 86
SbA—Sattre loam, 0 to 3 percent slopes 87
ScB—Scott Lake sandy loam, 1 to 6 percent slopes 87
SdA—Scott Lake loam, 0 to 3 percent slopes 88
SeB—Seaton silt loam, 2 to 6 percent slopes 89
SeC2—Seaton silt loam, 6 to 12 percent slopes, eroded 89
SeD2—Seaton silt loam, 12 to 25 percent slopes, eroded 90
SfA—Seaton silt loam, moderately well drained, 0 to 3 percent slopes 90
SgA—Seaton silt loam, sandy substratum, 0 to 2 percent slopes 91
SgB—Seaton silt loam, sandy substratum, 2 to 6 percent slopes 92
Sm—Seelyeville muck, 0 to 1 percent slopes 92
So—Shiffer loam, 0 to 2 percent slopes 93
SrB—Spencer silt loam, 2 to 6 percent slopes 93
SrC2—Spencer silt loam, 6 to 12 percent slopes, eroded 94
SsA—Spencer silt loam, gravelly substratum, 0 to 2 percent slopes 95
SsB—Spencer silt loam, gravelly substratum, 2 to 6 percent slopes 95
TeB—Tell silt loam, 1 to 6 percent slopes 96
Ud—Udifluvents, loamy, nearly level 97
Ve—Vesper silt loam, 0 to 2 percent slopes 97
Wb—Warman Variant sandy loam, 0 to 2 percent slopes 98
WeB—Withee silt loam, 1 to 6 percent slopes 98

Summary of Tables

Temperature and precipitation (table 1) 170

Freeze dates in spring and fall (table 2) 171

Probability. Temperature.

Growing season (table 3) 171

Acreage and proportionate extent of the soils (table 4) 172

Acres. Percent.

Prime farmland (table 5) 174

Land capability classes and yields per acre of crops and pasture (table 6) 175

Land capability. Corn. Corn silage. Oats. Bromegrass-alfalfa hay. Timothy-red clover hay. Kentucky bluegrass. Soybeans.

Woodland management and productivity (table 7) 182

Ordination symbol. Management concerns. Potential productivity. Trees to plant.

Windbreaks and environmental plantings (table 8) 191

Recreational development (table 9) 202

Camp areas. Picnic areas. Playgrounds. Paths and trails. Golf fairways.

Wildlife habitat (table 10) 210

Potential for habitat elements. Potential as habitat for—Openland wildlife, Woodland wildlife, Wetland wildlife.

Building site development (table 11) 216

Shallow excavations. Dwellings without basements. Dwellings with basements. Small commercial buildings. Local roads and streets. Lawns and landscaping.

Sanitary facilities (table 12) 225

Septic tank absorption fields. Sewage lagoon areas. Trench sanitary landfill. Area sanitary landfill. Daily cover for landfill.

Construction materials (table 13) 234

Roadfill. Sand. Gravel. Topsoil.

Water management (table 14) 241

Limitations for—Pond reservoir areas; Embankments, dikes, and levees. Features affecting—Drainage, Irrigation, Terraces and diversions, Grassed waterways.

Engineering index properties (table 15) 249
Depth. USDA texture. Classification—Unified, AASHTO. Fragments greater than 3 inches. Percentage passing sieve number—4, 10, 40, 200. Liquid limit. Plasticity index.

Physical and chemical properties of the soils (table 16) 261
Depth. Clay. Moist bulk density. Permeability. Available water capacity. Soil reaction. Shrink-swell potential. Erosion factors. Wind erodibility group. Organic matter.

Soil and water features (table 17) 268
Hydrologic group. Flooding. High water table. Bedrock. Total subsidence. Potential frost action. Risk of corrosion.

Engineering index test data (table 18) 274
Parent material. Report number. Depth. Moisture density. Percentage passing sieve—No. 4, No. 10, No. 40, No. 200. Percentage smaller than—0.05 mm, 0.02 mm, 0.005 mm, 0.002 mm. Liquid limit. Plasticity index. Classification—AASHTO, Unified.

Classification of the soils (table 19) 279
Family or higher taxonomic class.

Foreword

This soil survey contains information that can be used in land-planning programs in Chippewa County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Soil Conservation Service or the Cooperative Extension Service.

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Soil Survey of Chippewa County, Wisconsin

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United States Department of Agriculture, Soil Conservation Service,
in cooperation with
the Research Division of the College of Agricultural and
Life Sciences, University of Wisconsin

CHIPPEWA COUNTY is in the west-central part of Wisconsin (fig. 1). It is 30 miles from south to north and 36 miles from east to west. It has a total acreage of 666,464 acres, or about 1,041 square miles. In 1980, the county population was estimated at 52,004 (*6*). Chippewa Falls, in an area along the Chippewa River in the southwestern part of the county, is the county seat.

Approximately 63 percent of the total acreage is farmland. The county is among the leading Wisconsin counties in dairying (*17*). Urban and industrial developments are expanding. More people are employed in manufacturing than in agriculture. The county provides opportunities for a wide variety of recreational activities.

General Nature of the County

This section describes some of the physical and cultural characteristics of the county. These characteristics include history and development; climate; physiography, relief, and drainage; water supply; and transportation facilities and industry.

History and Development

Louis Hennepin and his companions were the first Europeans to traverse the survey area. They journeyed up the Chippewa River in 1680. The first permanent settlement in the area was established in 1822, when a sawmill was built along the Chippewa River. Soon after that date, the valley of the Chippewa River became an important lumber region (*4*). White pine was abundant in the virgin forests. In 1837, the largest sawmill in the world was built at Chippewa Falls.

The survey area at one time was part of the Territory of Michigan. In 1836, the Territory of Wisconsin was established. It had three counties—Crawford, Milwaukee, and Brown. In 1845, Chippewa County was formed from part of Crawford County. Chippewa Falls was declared the county seat. Chippewa County originally included about one-fourth of Wisconsin. Following 1845, numerous counties were detached from the original county. Chippewa County derives its name from the Indian word "Ojibewa," the name of an Indian tribe.

The early settlers included Canadians and French and some English, Irish, and Scots. German and Norwegian settlers came somewhat later. They were farmers. Dairying became the predominant farm activity by the turn of the century. The county has become one of the cheese-making centers of the nation.

Climate

Prepared by the National Climatic Center, Asheville, North Carolina

Winters in Chippewa County are very cold, and summers are short and fairly warm. Precipitation is fairly well distributed throughout the year, reaching a slight peak in summer. Snow covers the ground during much of the period from late fall through early spring.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Holcombe in the period 1951 to 1981. Table 2 shows probable dates of

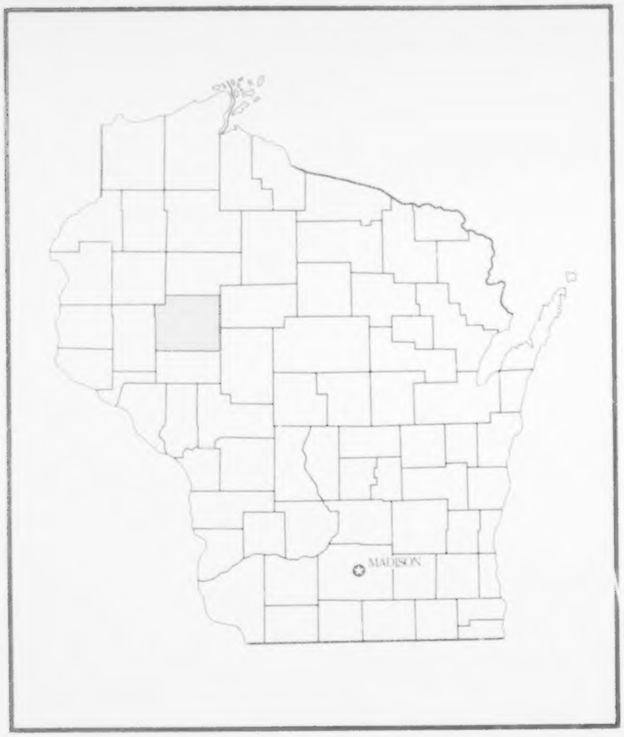

Figure 1.—Location of Chippewa County in Wisconsin.

the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperature is 15 degrees F, and the average daily minimum temperature is 5 degrees. The lowest temperature on record, which occurred at Holcombe on January 9, 1977, is -44 degrees. In summer the average temperature is 68 degrees, and the average daily maximum temperature is 80 degrees. The highest recorded temperature, which occurred at Holcombe on August 2, 1964, is 100 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is about 33 inches. Of this, about 25 inches, or 75 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 20 inches. The heaviest 1-day rainfall during the period of record was 5.85 inches at Holcombe on July 9, 1959. Thunderstorms occur on about 38 days each year.

The average seasonal snowfall is 43 inches. The greatest snow depth at any one time during the period of record was 38 inches. On the average, 62 days of the year have at least 1 inch of snow on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 65 percent of the time possible in summer and 45 percent in winter. The prevailing wind is from the northwest. Average windspeed is highest, 12 miles per hour, in spring.

Physiography, Relief, and Drainage

Chippewa County is divided into two physiographic areas. A terminal moraine is in the northeastern part of the county. This area is characterized by rolling or hilly topography, kettle holes, bogs, irregularly shaped lakes, and numerous swamps. Drainage patterns are poorly defined, and geologic erosion has leveled the surface very little. The southwestern part of the county is rolling and hilly. It has numerous sandstone and shale outcrops. It has well defined drainage patterns and few swamps. Several broad outwash plains are in this area.

Chippewa County is about 795 to 1,550 feet above sea level. The highest point in the county is Flambeau Ridge, in an area in Birch Creek Township near Holcombe Flowage. This ridge is a narrow quartzite monadnock about 3.5 miles long. It rises 300 to 400 feet above the surrounding areas.

The surface water in Chippewa County is within the drainage system of the Chippewa River. This river crosses the county from northeast to southwest, falling from an elevation of 993 feet above sea level at Cornell to 936 feet at Jim Falls and 839 feet at Chippewa Falls. Chippewa Falls is on the "Fall Line," where the rivers of northern Wisconsin leave the areas of resistant rocks of the Laurentian Shield and enter areas of softer sandstone. The Fall Line is an area of rapids or low cascades and is a good location for water-power dams. The Chippewa, Jump, Fisher, Yellow, and Wolf Rivers are the main streams draining the eastern part of the county. Sand, O'Neil, Duncan, and Elk Creeks are the major streams draining the western part.

Water Supply

Chippewa County has 21,037 acres of surface water. Of this total, 19,335 acres occurs as lakes and 1,702 acres as streams. The county has about 70 miles of trout streams (*9*). The chemical quality of the streams and lakes in the basin of the Chippewa River is generally good. The water is soft, and most streams are relatively unpolluted.

A large supply of good-quality water is available from the ground water reservoir in most parts of the county. Aquifers throughout the county provide water to wells and springs and replenish the streams and lakes through seepage and spring discharge. The ground water supply is likely to meet the domestic, agricultural, municipal, and industrial needs in the county. The ground water is generally soft. Minor water-use problems are caused by locally high concentrations of iron (*11*).

Probable well yields from the bedrock aquifers is 0 to 10 gallons per minute in the Precambrian crystalline rocks in the northeastern part of the county and 10 to 100 gallons per minute in the Cambrian sandstone in the southwestern part. Well yields from glacial deposits are estimated at 0 to 10 gallons per minute in the southwestern part of the county, 10 to 100 gallons per minute in the northeastern part, and 100 to 500 gallons per minute on the outwash plains in the central part (*19*).

Transportation Facilities and Industry

The principal north-south roads in the county are U.S. Highway 53 and State Highways 27, 178, 124, and 40. The main east-west roads are State Highways 64 and 29. Rail service is provided by two railroads. Scheduled air service is provided by an airport at Eau Claire.

The main agricultural enterprise in the county is dairying. Most of the milk is used in making cheese or is sold on the grade-A fluid milk market. Many food products also are processed, including meat, cheese, and vegetables. A brewery is located at Chippewa Falls.

The only commercial mineral resources in Chippewa County are sand and gravel. Saw logs and pulpwood are important forest products. Several wood-working plants are located in the county. Most of the pulpwood is used outside the county.

Chippewa County ranks high in diversified industry. Some of the manufactured items include plastics, leather products, aluminum products, wood products, brass castings and pumps, module homes, computers, filter elements, corrugated shipping containers, machinery, tools and dies, and insulated building panels (*3*).

The recreation industry also is important in Chippewa County. Recreational developments consist of state, county, city, and privately owned campgrounds, hiking and nature trails, and snowmobile trails. Other activities include cross-country skiing, golf, boating, canoeing, water skiing, and hunting and fishing (*16*).

How This Survey Was Made

This survey was made to provide information about the soils in the survey area. The information includes a description of the soils and their location and a discussion of the suitability, limitations, and management of the soils for specified uses. Soil scientists observed the steepness, length, and shape of slopes; the general pattern of drainage; the kinds of crops and native plants growing on the soils; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biologic activity.

The soils in the survey area occur in an orderly pattern that is related to the geology, the landforms, relief, climate, and the natural vegetation of the area. Each kind of soil is associated with a particular kind of landscape or with a segment of the landscape. By observing the soils in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept, or model, of how the soils were formed. Thus, during mapping, this model enables the soil scientist to predict with considerable accuracy the kind of soil at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, acidity, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. The system of taxonomic classification used in the United States is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpreted the data from these analyses and tests as well as the field-observed characteristics and the soil properties in terms of expected behavior of the soils under different uses. Interpretations for all of the soils were field tested through observation of the soils in different uses under different levels of management. Some interpretations are modified to fit local conditions, and new interpretations sometimes are developed to meet local needs. Data were assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management were assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can state with a fairly high degree of probability that a given soil will have a high water table within certain depths in most years, but they cannot assure that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Map Unit Composition

A map unit delineation on a soil map represents an area dominated by one major kind of soil or an area dominated by several kinds of soil. A map unit is identified and named according to the taxonomic classification of the dominant soil or soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural objects. In common with other natural objects, they have a characteristic variability in their properties. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of soils of other taxonomic classes. Consequently, every map unit is made up of the soil or soils for which it is named and some soils that belong to other taxonomic classes. These latter soils are called inclusions or included soils.

Most inclusions have properties and behavioral patterns similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting (similar) inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These are contrasting (dissimilar) inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of contrasting soils are mentioned in the map unit descriptions. A few inclusions may not have been observed and consequently are not mentioned in the descriptions, especially where the soil pattern was so complex that it was impractical to make enough observations to identify all of the kinds of soil on the landscape.

The presence of inclusions in a map unit in no way diminishes the usefulness or accuracy of the soil data. The objective of soil mapping is not to delineate pure taxonomic classes of soils but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but onsite investigation is needed to plan for intensive uses in small areas.

General Soil Map Units

The general soil map at the back of this publication shows the soil associations in this survey area. Each association has a distinctive pattern of soils, relief, and drainage. Each is a unique natural landscape. Typically, an association consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one association can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one association differ from place to place in slope, depth, drainage, and other characteristics that affect management.

The general soil map of Chippewa County joins with the general soil maps of Dunn and Eau Claire Counties. Because of differences in the extent of the major soils, some of the names of the associations in Chippewa County do not agree with those in Dunn and Eau Claire Counties. The soils in these associations have similar potentials for land uses. The differences in association names do not significantly affect the use of these maps for general planning.

Soil Descriptions

1. Menahga-Friendship Association

Deep, nearly level to sloping, excessively drained and moderately well drained, sandy soils on outwash plains and stream terraces

These soils are in areas on outwash plains and stream terraces where small hills and depressions are dissected by streams and small drainageways. Slopes are long and are plane or slightly convex. They generally are 0 to 6 percent but range from 0 to 12 percent.

This association makes up about 12 percent of the county. It is about 65 percent Menahga or similar soils, 15 percent Friendship or similar soils, and 20 percent soils of minor extent.

Menahga soils are nearly level to sloping and are excessively drained. They are on broad flats and side slopes on outwash plains. Typically, the surface layer is very dark grayish brown loamy sand about 8 inches thick. The subsoil is sand about 32 inches thick. The upper part is dark yellowish brown and very friable, and the lower part is strong brown and yellowish brown and is loose. The substratum to a depth of about 60 inches is brownish yellow sand.

Friendship soils are nearly level and gently sloping and are moderately well drained. They are in plane areas on outwash plains and stream terraces. Typically, the surface layer is very dark grayish brown loamy sand about 8 inches thick. The subsoil is sand about 28 inches thick. It is dark brown and very friable in the upper part and brown, mottled, and loose in the lower part. The substratum to a depth of about 60 inches is strong brown and light yellowish brown, mottled sand.

Some of the minor soils in this association are the Burkhardt, Markey, Meehan, and Newson soils. Burkhardt soils are excessively drained and somewhat excessively drained and are in landscape positions similar to those of the major soils. They formed in thin deposits of loamy material and are underlain by stratified sand and gravel. Markey soils are very poorly drained and are in depressions. They formed in organic material over sand. Meehan and Newson soils are sandy throughout. Meehan soils are somewhat poorly drained and are in shallow depressions. Newson soils are poorly drained and very poorly drained and are in depressions and drainageways.

Most areas of this association are used as cropland or pasture. The major soils are suited to cultivated crops, but soil blowing and drought are hazards. These soils are suited to trees.

The Menahga soils that have a slope of less than 6 percent are suited to dwellings. The wetness of the Friendship soils is a problem on sites for dwellings with basements. Septic tank absorption fields can function satisfactorily on both soils, but the effluent can pollute ground water because of rapid permeability in the substratum. Also, Friendship soils are poorly suited to septic tank absorption fields because of wetness.

2. Amery-Santiago Association

Deep, gently sloping to very steep, well drained, loamy and silty soils on moraines

These soils are on moraines characterized by many knolls, hills, and depressions. Slopes are short and

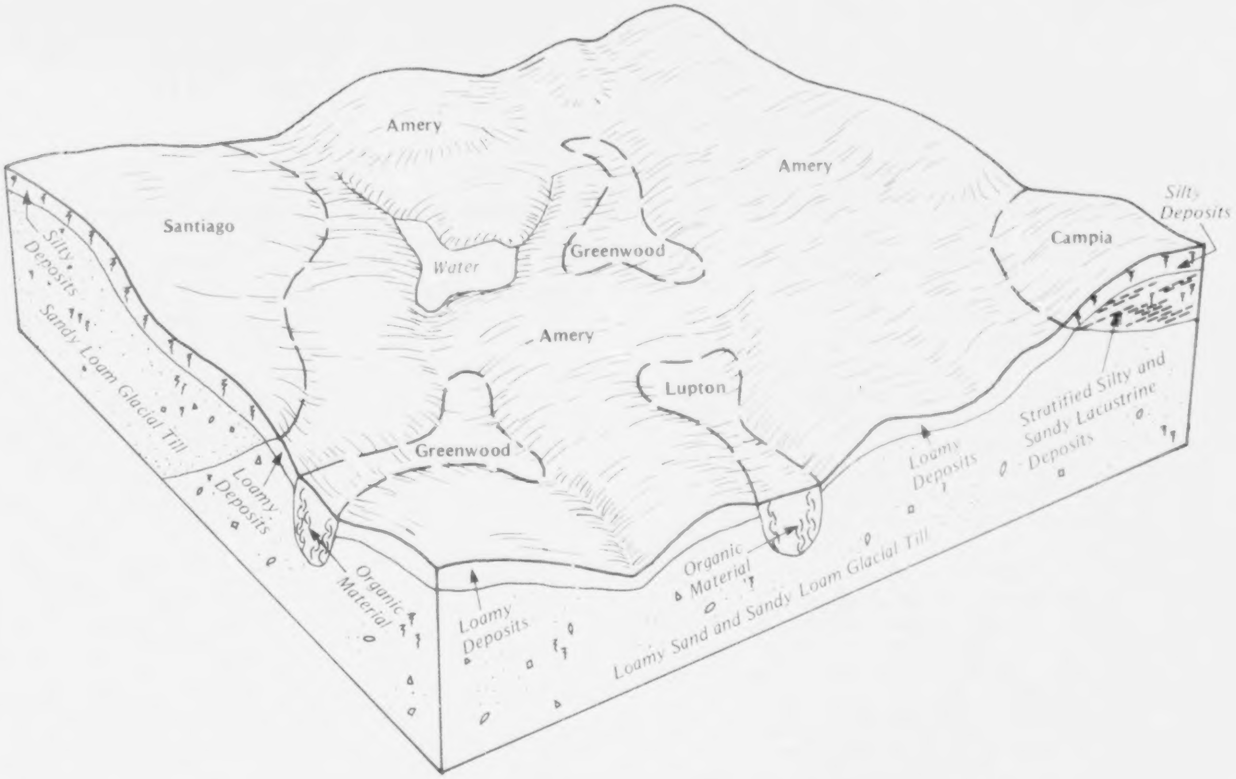
Amery
Amery
Santiago
Silty Deposits
Sandy Loam Glacial Till
Water
Greenwood
Amery
Silty Deposits
Campia
Lupton
Greenwood
Stratified Silty and Sandy Lacustrine Deposits
Loamy Deposits
Loamy Deposits
Organic Material
Organic Material
Loamy Deposits
Loamy Sand and Sandy Loam Glacial Till

Figure 2.—Pattern of soils and parent material in the Amery-Santiago association.

convex. They generally are 6 to 25 percent but range from 2 to 45 percent.

This association makes up about 10 percent of the county. It is about 75 percent Amery soils, 10 percent Santiago soils, and 15 percent soils of minor extent (fig. 2).

Amery soils are gently sloping to very steep. They are on ridgetops, side slopes, and knolls on moraines. Typically, the surface layer is very dark gray sandy loam about 2 inches thick. The subsurface layer is brown sandy loam about 9 inches thick. The subsoil is mostly reddish brown, friable sandy loam about 21 inches thick. The substratum to a depth of about 60 inches is reddish brown loamy sand.

Santiago soils are gently sloping to moderately steep. They are on side slopes and knolls on ground moraines. Typically, the surface layer is dark brown silt loam about 7 inches thick. The subsurface layer is mostly brown silt loam about 6 inches thick. The subsoil is about 17 inches thick. The upper part is mostly dark yellowish brown and dark brown, friable silt loam; the next part is dark brown, friable loam; and the lower part is reddish brown, friable sandy loam. The substratum to a depth of about 60 inches is dark reddish brown sandy loam.

Some of the minor soils in this association are the Campia, Chetek, Greenwood, Lupton, and Magnor soils. Campia soils are well drained and are on glacial lake plains and terraces. They formed in silty deposits and in the underlying stratified silty and sandy deposits. Chetek soils are somewhat excessively drained and are on outwash plains, stream terraces, and pitted moraines. They formed in thin deposits of loamy material and are underlain by stratified sand and gravel. Greenwood and Lupton soils are very poorly drained and are in depressions. They formed in organic material. Magnor soils are somewhat poorly drained and are on side slopes and in drainageways. They formed in silty deposits and in the underlying sandy loam glacial till.

Most areas of the Amery soils are wooded, but some of the less sloping areas are used as cropland. Most areas of the Santiago soils are used as cropland or pasture. The less sloping major soils are suited to cultivated crops, but water erosion is a hazard. Because slopes are extremely uneven, most areas are not suitable for stripcropping or terracing. The major soils are suited to trees.

The major soils that have a slope of less than 6 percent are suited to dwellings. They are only moderately suited or poorly suited to septic tank absorption fields because of moderate or moderately slow permeability.

3. Spencer-Magnor-Almena Association

Deep, nearly level to sloping, moderately well drained and somewhat poorly drained, silty soils on moraines

These soils are on ground moraines and terminal moraines. Slopes are long and slightly convex. They generally are 2 to 6 percent but range from 1 to 12 percent.

This association makes up about 44 percent of the county. It is about 25 percent Spencer or similar soils, 20 percent Magnor or similar soils, 15 percent Almena or similar soils, and 40 percent soils of minor extent (fig. 3).

Spencer soils are nearly level to sloping and are moderately well drained. They are on side slopes, foot slopes, and knolls on ground moraines and terminal moraines. Typically, the surface layer is very dark grayish brown silt loam about 9 inches thick. The subsurface layer is mostly brown silt loam about 6 inches thick. The subsoil is mottled, friable silt loam about 22 inches thick. It is mostly dark yellowish brown in the upper part and dark brown in the lower part. The upper 5 inches of the substratum is dark yellowish brown, mottled silt loam. The lower part to a depth of about 60 inches is yellowish red sandy loam. In some areas the substratum is sand and gravel below a depth of 40 inches.

Magnor soils are nearly level and gently sloping and are somewhat poorly drained. They are on side slopes and in drainageways on ground moraines. Typically, the surface layer is very dark grayish brown silt loam about 8 inches thick. The subsurface layer is mostly grayish brown, mottled silt loam about 6 inches thick. The subsoil is about 18 inches thick. It is mottled and friable. The upper part is mostly dark brown silt loam, the next part is dark brown sandy loam, and the lower part is reddish brown loam. The substratum to a depth of about 60 inches is reddish brown, mottled sandy loam.

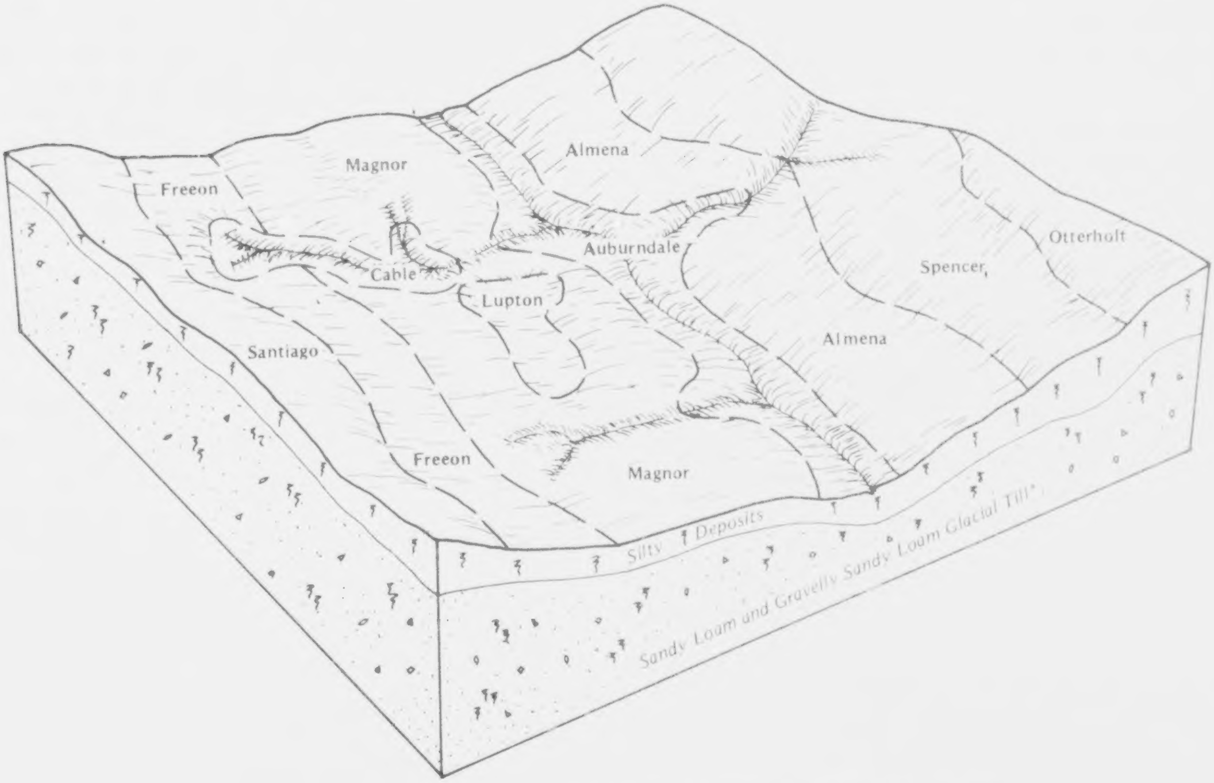

Figure 3.—Pattern of soils and parent material in the Spencer-Magnor-Almena association.

Almena soils are nearly level and gently sloping and are somewhat poorly drained. They are on side slopes and knolls on ground moraines. Typically, the surface layer is dark grayish brown silt loam about 9 inches thick. The subsurface layer is mostly grayish brown, mottled silt loam about 9 inches thick. The subsoil is mostly dark brown, mottled, friable silt loam about 30 inches thick. The substratum to a depth of about 60 inches is reddish brown gravelly sandy loam.

Some of the minor soils in this association are the Auburndale, Cable, Freeon, Lupton, Otterholt, and Santiago soils. Auburndale, Cable, and Lupton soils are poorly drained or very poorly drained. Auburndale and Cable soils are in drainageways and depressions. Lupton soils are in depressions. Freeon soils are moderately well drained and are in positions on the landscape similar to those of the Spencer soils. Otterholt and Santiago soils are well drained and are in the higher positions. Nearly all of the minor soils formed in silty deposits and in the underlying sandy loam or loam glacial till, but Lupton soils formed in decomposed woody organic material.

Most areas of this association are used as cropland or pasture. The major soils are suited to cultivated crops. Water erosion is a hazard, however, where the slope is more than 2 percent. Also, wetness is a limitation in areas of the Almena and Magnor soils.

The Almena and Magnor soils are poorly suited to dwellings because of wetness. The Spencer soils that have a slope of less than 6 percent are only moderately suited to dwellings with basements because of wetness and the shrink-swell potential. All of the major soils are poorly suited to septic tank absorption fields because of wetness and because of moderately slow permeability in the substratum.

4. Elkmound-Plainbo-Eleva Association

Shallow and moderately deep, gently sloping to very steep, well drained to excessively drained, loamy and sandy soils on uplands, outwash plains, and stream terraces

These soils are on uplands underlain by sandstone and on outwash plains and stream terraces. Slopes are moderately long and are mainly convex. They generally are 6 to 20 percent but range from 2 to 45 percent.

This association makes up about 10 percent of the county. It is about 30 percent Elkmound or similar soils, 20 percent Plainbo or similar soils, 20 percent Eleva or similar soils, and 30 percent soils of minor extent (fig. 4).

Elkmound soils are shallow, are gently sloping to very steep, and are well drained. They are on ridgetops, side slopes, and foot slopes in the uplands. Typically, the surface layer is dark brown loam about 7 inches thick. The subsoil is about 12 inches thick. It is yellowish brown and dark yellowish brown, friable sandy loam in the upper part and yellowish brown, very friable loamy fine sand in the lower part. Partially weathered sandstone is at a depth of about 19 inches.

Plainbo soils are moderately deep, are gently sloping to moderately steep, and are excessively drained. They are on foot slopes and side slopes in the uplands and on outwash plains and stream terraces. Typically, the surface layer is dark grayish brown loamy sand about 6 inches thick. The subsoil is yellowish brown, very friable and loose sand about 14 inches thick. The substratum is brownish yellow channery sand about 8 inches thick. Poorly cemented sandstone is at a depth of about 28 inches.

Eleva soils are moderately deep, are gently sloping to moderately steep, and are well drained and somewhat excessively drained. They are on ridgetops, side slopes, and foot slopes in the uplands. Typically, the surface layer is very dark grayish brown sandy loam about 9 inches thick. The subsoil is about 27 inches thick. It is friable. It is dark yellowish brown loam in the upper part and yellowish brown sandy loam in the lower part. The substratum is yellowish brown sand about 4 inches thick. Poorly cemented sandstone is at a depth of about 40 inches.

Some of the minor soils in this association are the Boone, Gale, Menahga, and Northfield soils. Boone soils are excessively drained and are in the higher positions on the landscape. They formed in sandy residuum over sandstone. Gale soils are well drained and are in landscape positions similar to those of the major soils. They formed in silty deposits and in a thin layer of sandy residuum. Menahga soils are excessively drained and are in the lower landscape positions. They formed in sandy deposits. Northfield soils are well drained and are in landscape positions similar to those of the major soils. They formed in thin deposits of silty material and are underlain by sandy residuum and sandstone.

Most areas of the less sloping major soils are used as cropland or pasture. Many areas are wooded. The less sloping major soils are suited to cultivated crops, but water erosion, soil blowing, and drought are hazards. The Plainbo soils are suited to trees, but the Eleva and Elkmound soils are poorly suited because of their limited depth to sandstone.

Because of the limited depth to sandstone, the major soils that have a slope of less than 6 percent are poorly suited or only moderately suited to dwellings with basements. They are poorly suited to septic tank absorption fields because of the depth to sandstone in all three soils and moderately rapid or rapid permeability in the Eleva and Plainbo soils.

5. Billett-Rosholt-Oesterle Association

Deep, nearly level to sloping, well drained to somewhat poorly drained, loamy soils on outwash plains and stream terraces

These soils are in plane or slightly convex areas on outwash plains and stream terraces. Slopes are long. They generally are 0 to 6 percent but range from 0 to 12 percent.

This association makes up about 10 percent of the county. It is about 30 percent Billett soils, 30 percent Rosholt soils, 15 percent Oesterle or similar soils, and 25 percent soils of minor extent.

Billett soils are nearly level to sloping and are well drained and moderately well drained. They are in plane or slightly convex areas on outwash plains. Typically, the surface layer is very dark grayish brown sandy loam about 9 inches thick. The subsoil is about 25 inches thick. It is dark brown. It is friable sandy loam in the upper part and very friable loamy sand in the lower part. The substratum to a depth of about 60 inches is strong brown and yellowish brown, stratified fine sand and sand.

Rosholt soils are nearly level to sloping and are well drained. They are in plane areas and on convex side slopes and knolls on stream terraces and outwash plains. Typically, the surface layer is dark brown sandy loam about 8 inches thick. The subsoil is about 24 inches thick. It is mostly dark brown, friable sandy loam in the upper part and dark brown, very friable gravelly sandy loam in the lower part. The substratum to a depth of about 60 inches is reddish brown, stratified sand and gravel.

Oesterle soils are nearly level and are somewhat poorly drained. They are in drainageways on stream terraces and outwash plains. Typically, the surface layer is very dark brown sandy loam about 7 inches thick. The subsurface layer is mostly dark grayish brown sandy loam about 10 inches thick. The subsoil is about 17 inches thick. It is mottled. It is dark brown, friable sandy loam in the upper part and dark yellowish brown, very friable gravelly loamy sand in the lower part. The substratum to a depth of about 60 inches is yellowish brown sand and gravel.

Some of the minor soils in this association are the Lows, Meridian, and Sattre soils. Lows soils are poorly drained and are in drainageways. They formed in loamy and silty deposits underlain by sand. Meridian and Sattre soils are well drained and are in landscape positions

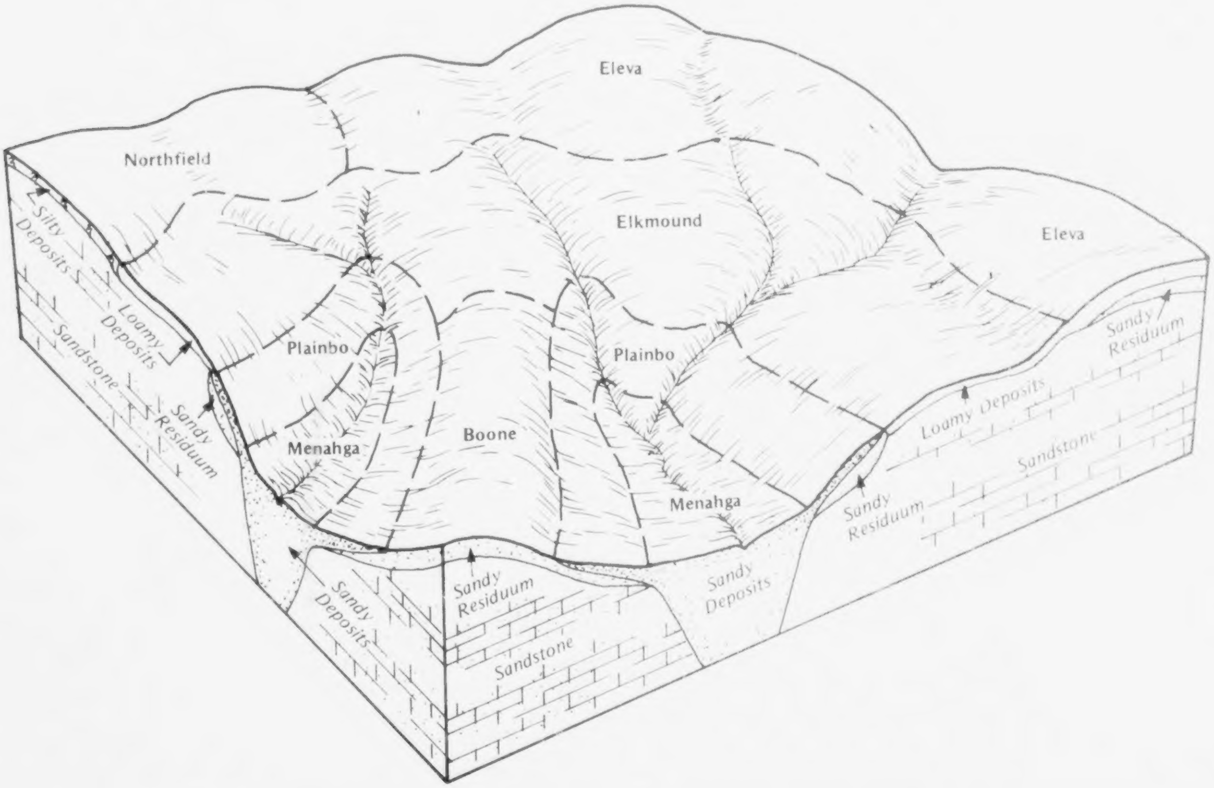

Figure 4.—Pattern of soils and parent material in the Elkmound-Plainbo-Eleva association.

similar to those of the Billett and Rosholt soils. They formed in loamy deposits over sandy material or sand and gravel.

Most areas of the Billett and Rosholt soils are used as cropland. Most areas of the Oesterle soils are wooded. The major soils are suited to cultivated crops, but drought and soil blowing are hazards. Also, wetness is a limitation in areas of the Oesterle soils. The major soils are suited to trees.

The Billett and Rosholt soils that have a slope of less than 6 percent are suited to dwellings, but the Oesterle soils are poorly suited because of wetness. Septic tank absorption fields can function satisfactorily on the major soils that have a slope of less than 6 percent, but the effluent can pollute ground water because of rapid or very rapid permeability in the substratum. Also, the wetness of the Oesterle soils is a limitation.

6. Seaton-Gale Association

Deep and moderately deep, nearly level to steep, moderately well drained and well drained, silty soils on uplands

These soils are on uplands underlain by sandstone and in areas of valley fill. Slopes are long and convex. They generally are 6 to 25 percent but range from 0 to 25 percent.

This association makes up about 4 percent of the county. It is about 60 percent Seaton soils, 20 percent Gale soils, and 20 percent soils of minor extent.

Seaton soils are deep, are nearly level to steep, and are well drained or moderately well drained. They are on ridgetops, side slopes, and foot slopes on uplands and in areas of valley fill. Typically, the surface layer is dark grayish brown silt loam about 7 inches thick. The subsurface layer is brown silt loam about 3 inches thick. The subsoil is yellowish brown and dark yellowish brown, friable silt loam about 32 inches thick. The substratum to a depth of about 60 inches is yellowish brown silt loam.

Gale soils are moderately deep, are gently sloping to moderately steep, and are well drained. They are on ridgetops and side slopes in the uplands. Typically, the surface layer is very dark grayish brown silt loam about 8 inches thick. The subsurface layer is brown silt loam about 4 inches thick. The subsoil is about 24 inches thick. It is dark brown and dark yellowish brown, friable silt loam in the upper part and yellowish brown, friable loamy fine sand in the lower part. Sandstone is at a depth of about 36 inches.

Some of the minor soils in this association are the Hixton and Northfield soils. Hixton soils are well drained and are in landscape positions similar to those of the major soils. They formed in loamy deposits underlain by sandy residuum and sandstone. Northfield soils are well drained and are on ridgetops and side slopes. They formed in thin deposits of silty material and are underlain by sandy residuum and sandstone.

Most areas of this association are used as cropland or pasture. The major soils are suited to cultivated crops, but water erosion is a hazard. These soils are suited to trees.

The well drained Seaton soils that have a slope of less than 6 percent are suited to dwellings and septic tank absorption fields. Because of the moderate depth to sandstone and the shrink-swell potential, the Gale soils that have a slope of less than 6 percent are only moderately suited to dwellings with basements. They are poorly suited to septic tank absorption fields because of the depth to sandstone and because of rapid permeability in the sandy part of the subsoil.

7. Flambeau-Fallcreek-Withee Association

Deep, nearly level to sloping, moderately well drained and somewhat poorly drained, loamy and silty soils on ground moraines

These soils are in plane or slightly convex areas on ground moraines. Slopes are long. They generally are 1 to 6 percent but range from 1 to 12 percent.

This association makes up about 9 percent of the county. It is about 35 percent Flambeau or similar soils, 20 percent Fallcreek or similar soils, 15 percent Withee soils, and 30 percent soils of minor extent (fig. 5).

Flambeau soils are gently sloping and sloping and are moderately well drained. They are on side slopes and knolls. Typically, the surface layer is very dark grayish brown loam about 8 inches thick. The subsurface layer is about 9 inches of brown loam and brown, mottled sandy loam. The subsoil is about 19 inches thick. It is reddish brown, mottled, and firm. It is loam in the upper part and sandy clay loam in the lower part. The substratum to a depth of about 60 inches is reddish brown loam.

Fallcreek soils are gently sloping and are somewhat poorly drained. They are on side slopes and knolls. Typically, the surface layer is very dark grayish brown sandy loam about 8 inches thick. The subsurface layer is mostly brown, mottled sandy loam about 12 inches thick. The subsoil is mostly reddish brown, mottled, firm loam about 20 inches thick. The substratum to a depth of about 60 inches is reddish brown loam.

Withee soils are nearly level and gently sloping and are somewhat poorly drained. They are on concave slopes. Typically, the surface layer is dark grayish brown silt loam about 8 inches thick. The subsurface layer is mostly pale brown, mottled silt loam about 10 inches thick. The subsoil is about 24 inches thick. It is mostly brown, mottled, friable silt loam in the upper part and reddish brown, mottled, firm loam in the lower part. The substratum to a depth of about 60 inches is reddish brown loam.

Some of the minor soils in this association are the Almena, Arland, Cable, Loyal, Rib, and Spencer soils. Almena soils are somewhat poorly drained and are in landscape positions similar to those of the Fallcreek

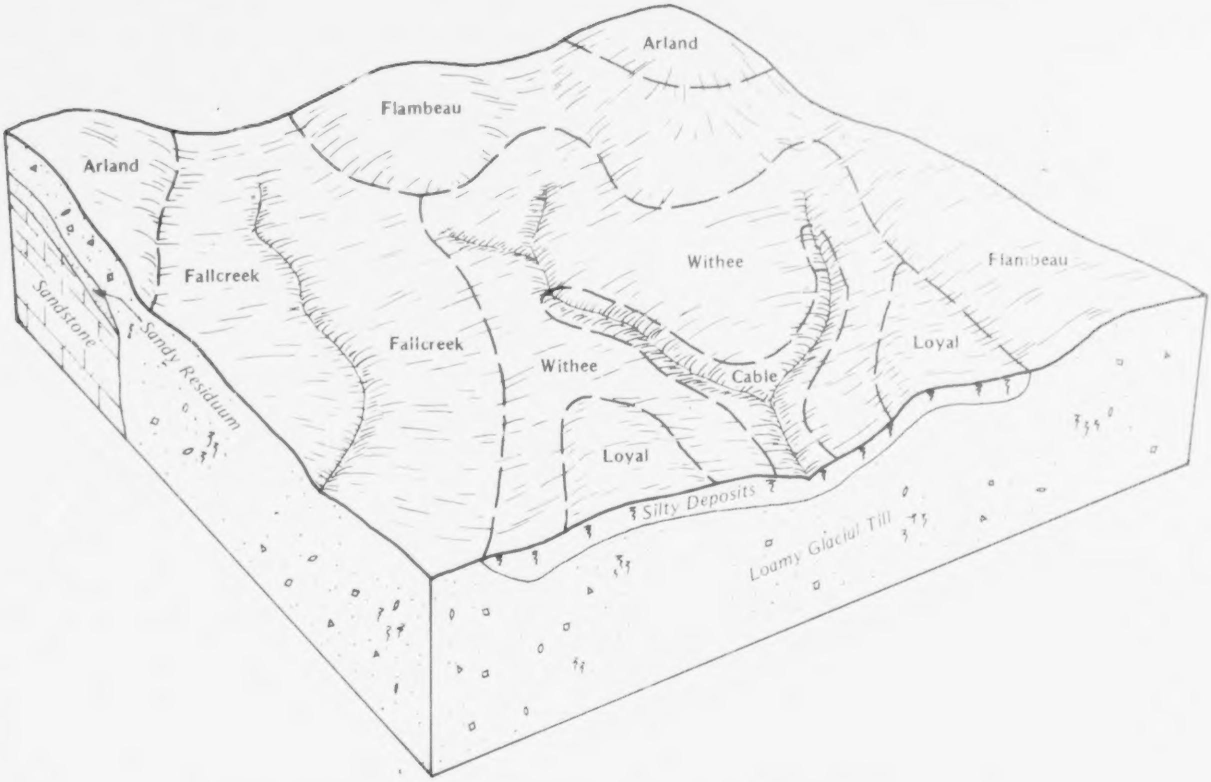

Figure 5.—Pattern of soils and parent material in the Flambeau-Fallcreek-Withee association.

soils. They formed in silty deposits over gravelly sandy loam glacial till. Arland soils are well drained and are in the slightly higher landscape positions. They formed in loamy glacial till underlain by sandy residuum and sandstone. Cable soils are poorly drained and very poorly drained and are in drainageways and depressions. They formed in silty deposits and in the underlying sandy loam glacial till. Loyal soils are moderately well drained and are slightly higher on the landscape than the Fallcreek and Withee soils. They formed in silty deposits and in the underlying loam glacial till. Rib soils are poorly drained and are in drainageways and depressions. They formed in silty and loamy deposits underlain by stratified sand and gravel. Spencer soils are moderately well drained and are in landscape positions similar to those of the Flambeau soils. They formed in silty deposits underlain by sandy loam glacial till.

Most areas of this association are used as cropland. The major soils are suited to cultivated crops, but water erosion is a hazard. Also, wetness is a limitation in areas of the Fallcreek and Withee soils. The major soils are suited to trees.

Mainly because of wetness, the Fallcreek and Withee soils are poorly suited to dwellings with basements and the Flambeau soils are only moderately suited. All of the major soils are poorly suited to septic tank absorption fields because of the wetness and moderately slow permeability.

8. Kert-Elm Lake-Vesper Association

Deep and moderately deep, nearly level and gently sloping, somewhat poorly drained and poorly drained, silty and sandy soils on uplands

These soils are on uplands underlain by sandstone and shale. Slopes are short and are plane or convex. They range from 0 to 6 percent.

This association makes up about 1 percent of the county. It is about 35 percent Kert soils, 25 percent Elm Lake soils, 15 percent Vesper soils, and 25 percent soils of minor extent.

Kert soils are deep, are nearly level and gently sloping, and are somewhat poorly drained. They are on foot slopes. Typically, the surface layer is very dark grayish brown silt loam about 8 inches thick. The subsurface layer is mostly brown and grayish brown, mottled silt loam about 14 inches thick. The subsoil is about 18 inches thick. It is mottled and friable. It is pale olive loam in the upper part and dark brown sandy loam in the lower part. The upper part of the substratum is olive yellow and pale yellow, stratified sand and silt. The lower part to a depth of about 60 inches is reddish yellow loam.

Elm Lake soils are deep or moderately deep, are nearly level, and are poorly drained. They are in drainageways and depressions. Typically, the surface layer is black loamy sand about 4 inches thick. The substratum is about 44 inches thick. It is grayish brown, light brownish gray, and pale brown loamy sand and sand in the upper part and gray and olive gray, mottled silty clay loam in the lower part. Poorly cemented sandstone interbedded with shale is at a depth of about 48 inches.

Vesper soils are deep, are nearly level, and are poorly drained. They are in drainageways. Typically, the surface layer is very dark gray silt loam about 7 inches thick. The subsurface layer is dark grayish brown silt loam about 5 inches thick. The subsoil is about 26 inches thick. It is mottled. It is dark grayish brown, friable loam in the upper part and olive gray, firm clay loam in the lower part. The substratum to a depth of about 60 inches is grayish brown, mottled, stratified sand and loam.

Some of the minor soils in this association are the Hiles, Humbird, and Merrillan soils. Hiles soils are moderately well drained and are on foot slopes. They formed in silty deposits and in the underlying material weathered from sandstone interbedded with shale. Humbird soils are moderately well drained and are in the higher landscape positions. They formed in loamy deposits and in the underlying material weathered from sandstone interbedded with shale. Merrillan soils are somewhat poorly drained and are in landscape positions similar to those of the Kert soils. They formed in loamy deposits and in the underlying material weathered from sandstone interbedded with shale.

Most areas of this association are used as cropland or pasture. Many areas of the Elm Lake soils are wooded. The major soils are suited to cultivated crops and pasture, but wetness is a limitation. If drained, the Elm Lake soils are subject to soil blowing. The Kert soils are suited to trees, but the Vesper and Elm Lake soils are poorly suited because of wetness.

The major soils are poorly suited to dwellings and septic tank absorption fields, mainly because of wetness, ponding, and slow or very slow permeability in the subsoil or substratum.

Detailed Soil Map Units

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under "Use and Management of the Soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the substratum, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the substratum. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Amery sandy loam, 6 to 12 percent slopes, is a phase of the Amery series.

Some map units are made up of two or more major soils. These map units are called soil complexes. A *soil complex* consists of two or more soils, or one or more soils and a miscellaneous area, in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Chetek-Mahtomedi complex, 25 to 40 percent slopes, is an example.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Pits, gravel, is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

Several soils that were mapped in Chippewa County join with similar soils that have different names in Dunn and Eau Claire Counties. The similar soils were not mapped in Chippewa County because their extent was insignificant. One complex mapped in Chippewa County was not mapped in Dunn or Eau Claire County because the soil patterns were different. One complex mapped in Dunn County and three complexes mapped in Eau Claire County were not mapped in Chippewa County because their extent was insignificant or the soil patterns were different. These complexes join with a similar soil in Chippewa County. The alluvial land mapped in Eau Claire County was not mapped in Chippewa County. This land joins with recently established series in Chippewa County. Several soils mapped in Chippewa County do not join with the soils mapped in Barron County because of the age and level of detail in the soil survey of Barron County. This problem will be rectified when the survey of Barron County is updated.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

Soil Descriptions

AfB—Alban fine sandy loam, 2 to 6 percent slopes. This deep, gently sloping, moderately well drained soil is in slightly concave areas on glacial lake plains and terraces. Individual areas are irregular in shape and generally range from 5 to 20 acres in size.

Typically, the surface layer is dark grayish brown fine sandy loam about 8 inches thick. The subsurface layer is mostly brown fine sandy loam about 10 inches thick. The subsoil is about 20 inches thick. It is mostly dark brown, very friable and friable fine sandy loam and very fine sandy loam. It is mottled in the lower part. The substratum to a depth of about 60 inches is brown, stratified silt, very fine sand, and fine sand. In some places the surface layer is loamy fine sand, very fine sandy loam, or loam or is thicker and darker. In other places the substratum is sandy loam till. In some areas the slope is less than 2 or more than 6 percent.

Included with this soil in mapping are small areas of the well drained Antigo, excessively drained Menahga, and well drained Rosholt soils. Antigo soils are silt loam in the surface layer and in the upper part of the subsoil and are underlain by stratified sand and gravel. They are in the slightly lower positions on the landscape. Menahga and Rosholt soils are in positions similar to those of the Alban soil. Menahga soils are sandy throughout. Rosholt soils are underlain by stratified sand and gravel. Included soils make up 5 to 15 percent of the unit.

Permeability is moderate in the Alban soil. The available water capacity is high. The organic matter content is low or moderately low in the surface layer. This layer is friable and can be easily tilled throughout a wide range of moisture content. The depth to the seasonal high water table ranges from 3 to 6 feet.

Most areas are used as cropland. A few are wooded. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, water erosion is a slight or moderate hazard. Also, the soil is subject to soil blowing and is moderately droughty. Conservation tillage and field windbreaks help to control erosion and soil blowing. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazards of erosion and soil blowing.

A cover of pasture plants is effective in controlling erosion and soil blowing. Overgrazing can cause surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, measures that improve fertility, and pasture rotation help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

Because of the wetness, this soil is poorly suited to septic tank absorption fields. This limitation can be overcome by mounding the site with suitable filtering material. Also, the effluent can be pumped to an absorption field on a better suited soil in some nearby areas.

This soil is suited to dwellings without basements, but it is only moderately suited to dwellings with basements because of the wetness. This limitation can be overcome by installing tile drains around the foundations and providing gravity outlets or other dependable outlets and by constructing the foundation on coarse textured fill material above the level of wetness.

Because of the potential for frost action, this soil is only moderately suited to local roads and streets. This limitation can be overcome by replacing the upper part of the soil with coarse textured base material, such as sand or gravel.

The land capability classification is IIe. The woodland ordination symbol is 3A.

AfC—Alban fine sandy loam, 6 to 12 percent slopes. This deep, sloping, well drained soil is in convex areas on glacial lake plains and terraces. Individual areas are irregular in shape and generally range from 5 to 15 acres in size.

Typically, the surface layer is dark grayish brown fine sandy loam about 7 inches thick. The subsurface layer is mostly dark brown fine sandy loam about 11 inches thick. The subsoil is about 18 inches of dark brown, friable fine sandy loam and very fine sandy loam. The substratum to a depth of about 60 inches is brown, stratified very fine sand, fine sand, and silt. In places the surface layer is loamy fine sand, very fine sandy loam, or loam. In some areas the slope is less than 6 or more than 12 percent.

Included with this soil in mapping are small areas of the excessively drained Menahga soils. These soils are in positions on the landscape similar to those of the Alban soil. They are sandy throughout. They make up 5 to 15 percent of the unit.

Permeability is moderate in the Alban soil. The available water capacity is high. The organic matter content is low or moderately low in the surface layer. This layer is friable and can be easily tilled throughout a wide range of moisture content.

Most areas are used as cropland. A few are used as pasture or woodland. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, water erosion is a moderate hazard. Also, the soil is subject to soil blowing. Terraces, grassed waterways, contour farming, contour stripcropping, and conservation tillage help to control erosion and soil blowing. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazards of erosion and soil blowing.

A cover of pasture plants is effective in controlling erosion and soil blowing. Overgrazing can cause surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, pasture rotation, measures that improve fertility, and timely deferment of grazing help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

Because of the moderate permeability and the slope, this soil is only moderately suited to septic tank absorption fields. The moderate permeability can be overcome by mounding the site with suitable filtering material. The slope can be overcome by cutting and filling or by installing a trench absorption system on the contour. Also, the absorption field can be installed in the included areas where the slope is less than 6 percent.

Because of the slope, this soil is only moderately suited to dwellings. This limitation can be overcome by cutting and filling, by installing retaining walls, or by designing the dwellings so that one side of the basement fronts on the lower part of the slope. Also, the dwellings can be constructed in the included areas where the slope is less than 6 percent.

Because of the slope and the potential for frost action, this soil is only moderately suited to local roads and streets. The slope can be overcome by shaping the roadway through cutting and filling. Also, the road can be built in the less sloping areas. Replacing the upper part of the soil with coarse textured base material, such as sand or gravel, helps to prevent the damage caused by frost action.

The land capability classification is IIIe. The woodland ordination symbol is 3A.

AgB—Almena silt loam, 1 to 6 percent slopes. This deep, nearly level and gently sloping, somewhat poorly drained soil is on side slopes and knolls on ground moraines. Individual areas are irregular in shape and generally range from 10 to 150 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 9 inches thick. The subsurface layer is mostly grayish brown, mottled silt loam about 9 inches thick. The subsoil is mostly dark brown, mottled, friable silt loam about 30 inches thick. The substratum to a depth of about 60 inches is reddish brown gravelly sandy loam. In places it is loam or sandy loam. In some areas the slope is more than 6 percent.

Included with this soil in mapping are small areas of the poorly drained Auburndale and moderately well drained Spencer soils. Auburndale soils are in drainageways and depressions on the lower parts of the landscape. Spencer soils are in the slightly higher positions on the landscape. Included soils make up 5 to 10 percent of the unit.

Permeability is moderately slow or moderate in the subsoil of the Almena soil and moderately slow in the substratum. The available water capacity is high. The organic matter content is moderate in the surface layer. This layer is friable and can be easily tilled, but it tends to crust and puddle after hard rains or if it is tilled when too wet. The rooting depth of most crops is limited by a seasonal high water table, which is at a depth of 1.0 to 2.5 feet in undrained areas.

Most areas are used as cropland. If drained, this soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, water erosion is a slight or moderate hazard. Applying a system of conservation tillage and returning crop residue to the soil or adding other organic material help to maintain fertility and good tilth and increase the rate of water infiltration. Land smoothing, a surface drainage system, diversions, and grassed waterways help to remove excess water.

A cover of pasture plants is effective in controlling water erosion. The surface layer is subject to crusting, which restricts the emergence of small-seeded crops. Alfalfa is generally short lived because of the seasonal high water table and the winterkill caused by frost heave. Red clover is generally grown. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, measures that improve fertility, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is suited to trees. The equipment limitation and the windthrow hazard are management concerns. Because of the wetness, hand planting or machine planting on prepared ridges generally is needed if natural regeneration is unreliable. Selection of vigorous nursery stock for planting reduces the seedling mortality rate. Harvesting is frequently limited to periods when the ground is frozen. Harvesting by clearcut or area-selection methods helps to prevent windthrow of the remaining trees. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

Because of the wetness and the moderately slow permeability, this soil is poorly suited to septic tank absorption fields. Mounding the site with suitable filtering material helps to overcome these limitations. Also, the effluent can be pumped to an absorption field on a better suited soil in some nearby areas.

Because of the wetness, this soil is poorly suited to dwellings. This limitation can be overcome by constructing foundations on coarse textured fill material above the level of wetness and by installing tile drains around the foundations and providing gravity outlets or other dependable outlets.

Because of low strength and the potential for frost action, this soil is poorly suited to local roads and streets. Low strength can be overcome by replacing the upper part of the soil with coarse textured base material, such as sand or gravel, and by increasing the thickness of the pavement or base material. Installing a subsurface drainage system and replacing the upper part of the soil with coarse textured base material help to prevent the damage caused by frost action.

The land capability classification is IIe. The woodland ordination symbol is 3W.

AIB—Amery sandy loam, 2 to 6 percent slopes. This deep, gently sloping, well drained soil is on the tops of ridges on moraines. Individual areas are irregular in shape and generally range from 5 to 40 acres in size.

Typically, the surface layer is very dark grayish brown sandy loam about 8 inches thick. The subsoil is about 28 inches thick. The upper part is mostly dark brown, friable sandy loam; the next part is reddish brown, friable sandy loam; and the lower part is yellowish red, very friable loamy sand. The substratum to a depth of about 60 inches is yellowish red sandy loam. In places the surface layer is loam or loamy sand. In some areas cobblestones are on the surface. In other areas the slope is more than 6 percent.

Included with this soil in mapping are small areas of the very poorly drained Beseman, poorly drained and very poorly drained Cable, and somewhat poorly drained Magnor soils. Beseman soils formed in organic material in depressions. Cable soils are in depressions and drainageways. Magnor soils are on side slopes and in drainageways. Included soils make up 5 to 15 percent of the unit.

Permeability is moderately slow in the Amery soil. The available water capacity is moderate. The organic matter content is moderately low or moderate in the surface layer. This layer is friable and can be easily tilled throughout a wide range of moisture content.

Most areas are wooded. A few are used as cropland or pasture. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, water erosion is a slight or moderate hazard. Also, the soil is subject to soil blowing. Most areas have slopes that are too short and irregular to be stripcropped, terraced, or cultivated on the contour. Conservation tillage and winter cover crops help to control erosion and soil blowing. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazards of erosion and soil blowing.

A cover of pasture plants is effective in controlling erosion and soil blowing. Overgrazing can cause surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, measures that improve fertility, and pasture rotation help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

This soil is suited to dwellings. Because of the moderately slow permeability, however, it is poorly suited to septic tank absorption fields. This limitation can be overcome by constructing a filtering mound of suitable material and possibly by increasing the size of the absorption field.

Because of the potential for frost action, this soil is only moderately suited to local roads and streets. Replacing the upper part of the soil with coarse textured base material, such as sand or gravel, helps to prevent the damage caused by frost action.

The land capability classification is IIe. The woodland ordination symbol is 4A.

AIC—Amery sandy loam, 6 to 12 percent slopes. This deep, sloping, well drained soil is on ridgetops and side slopes on moraines. Individual areas are irregular in shape and generally range from 10 to 100 acres in size.

Typically, the surface layer is black sandy loam about 1 inch thick. The subsurface layer is mostly light brownish gray and brown sandy loam about 9 inches thick. The subsoil is mostly reddish brown and yellowish red, friable sandy loam about 26 inches thick. The substratum to a depth of about 60 inches is reddish brown sandy loam. In places the surface layer is loam. In some areas cobblestones are on the surface. In other areas the slope is less than 6 or more than 12 percent.

Included with this soil in mapping are small areas of the poorly drained and very poorly drained Cable, moderately well drained Freeon, very poorly drained Greenwood, and somewhat poorly drained Magnor soils. Cable soils are in depressions. Freeon soils are in the slightly lower positions on the landscape. Greenwood soils formed in organic material in depressions. Magnor soils are on side slopes and in drainageways. Included soils make up 10 to 15 percent of the unit.

Permeability and the available water capacity are moderate in the Amery soil. The organic matter content is moderately low or moderate in the surface layer. This layer is friable and can be easily tilled throughout a wide range of moisture content.

Most areas are wooded. A few are used as cropland or pasture. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, water erosion is a moderate hazard. Also, the soil is subject to soil blowing. Most areas have slopes that are too short and irregular to be stripcropped or cultivated on the contour. Conservation tillage and winter cover crops help to control erosion and soil blowing. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazards of erosion and soil blowing.

A cover of pasture plants is effective in controlling erosion and soil blowing. Overgrazing can cause surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, pasture rotation, measures that improve fertility, and timely deferment of grazing help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

Because of the moderate permeability and the slope, this soil is only moderately suited to septic tank absorption fields. The moderate permeability can be overcome by mounding the site with suitable filtering material. The slope can be overcome by cutting and filling or by installing a trench absorption system on the contour. Also, the absorption field can be installed in the included areas where the slope is less than 6 percent.

Because of the slope, this soil is only moderately suited to dwellings. This limitation can be overcome by cutting and filling, by installing retaining walls, or by designing the dwelling so that one side of the basement fronts on the lower part of the slope. Also, the dwelling can be constructed in the included areas where the slope is less than 6 percent.

Because of the slope and the potential for frost action, this soil is only moderately suited to local roads and streets. The slope can be overcome by shaping the roadway through cutting and filling. Also, the road can be built in the less sloping areas. Replacing the upper part of the soil with coarse textured base material, such as sand or gravel, helps to prevent the damage caused by frost action.

The land capability classification is IIIe. The woodland ordination symbol is 4A.

AID—Amery sandy loam, 12 to 25 percent slopes. This deep, moderately steep and steep, well drained soil is on ridgetops, side slopes, and knolls on moraines. Individual areas are irregular in shape and generally range from 10 to 150 acres in size.

Typically, the surface layer is very dark gray sandy loam about 2 inches thick. The subsurface layer is brown sandy loam about 9 inches thick. The subsoil is mostly reddish brown, friable sandy loam about 21 inches thick. The substratum to a depth of about 60 inches is reddish brown loamy sand. in places the surface layer is loam or silt loam. In some areas cobblestones are on the surface. In other areas the slope is less than 12 or more than 25 percent.

Included with this soil in mapping are small areas of the poorly drained and very poorly drained Cable, very poorly drained Greenwood, well drained Rosholt, and somewhat excessively drained Mahtomedi soils. Cable soils are in depressions. Greenwood soils formed in organic material in depressions. Rosholt and Mahtomedi soils are in positions on the landscape similar to those of the Amery soil. Rosholt soils are underlain by sand and gravel. Mahtomedi soils formed in sandy deposits over sand and gravel. Included soils make up 10 to 15 percent of the unit.

Permeability and the available water capacity are moderate in the Amery soil. The organic matter content is moderately low or moderate in the surface layer. This layer is friable and can be easily tilled throughout a wide range of moisture content.

Most areas are wooded. A few are used as cropland or pasture. This soil is suited to corn and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, water erosion is a severe hazard. Also, the soil is subject to soil blowing. Most areas have slopes that are too short and irregular to be stripcropped or cultivated on the contour. Conservation tillage, crop rotations that include grasses and legumes, and winter cover crops help to control erosion and soil blowing Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazards of erosion and soil blowing.

A cover of pasture plants is effective in controlling erosion and soil blowing. Overgrazing can cause surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, pasture rotation, measures that improve fertility, and timely deferment of grazing help to keep the pasture in good condition.

This soil is suited to trees. The erosion hazard and the equipment limitation are management concerns. Planting on the contour and carefully locating skid roads during harvest minimize erosion. Seedling survival on the steeper slopes facing south or west can be improved by careful planting of vigorous nursery stock. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

Because of the slope, this soil is poorly suited to septic tank absorption fields. This limitation can be overcome by cutting and filling or by installing a trench absorption system on the contour. Also, the absorption field can be installed in the included areas where the slope is less than 12 percent.

Because of the slope, this soil is poorly suited to dwellings. This limitation can be overcome by cutting and filling, by installing retaining walls, or by designing the dwelling so that one side of the basement fronts on the lower part of the slope. Also, the dwelling can be built in the included areas where the slope is less than 12 percent.

Because of the slope, this soil is poorly suited to local roads and streets. This limitation can be overcome by shaping the roadway through cutting and filling. Also, the road can be built in the less sloping areas.

The land capability classification is IVe. The woodland ordination symbol is 4R.

AlF—Amery sandy loam, 25 to 45 percent slopes. This deep, steep and very steep, well drained soil is on ridgetops, side slopes, and knolls on moraines. Individual areas are irregular in shape and generally range from 5 to 40 acres in size.

Typically, the surface layer is black sandy loam about 4 inches thick. The subsurface layer is mostly brown sandy loam about 9 inches thick. The subsoil is about 18 inches thick. It is dark brown, friable sandy loam in the upper part and reddish brown, very friable loamy sand in the lower part. The substratum to a depth of about 60 inches is yellowish red loamy sand. In some places the surface layer is loam. In other places the substratum is sandy loam. In some areas cobblestones and boulders are on the surface. In other areas the slope is less than 25 percent.

Included with this soil in mapping are small areas of the poorly drained and very poorly drained Cable, very poorly drained Greenwood, and excessively drained Mahtomedi soils. Cable soils are in depressions. Greenwood soils formed in organic material in depressions. Mahtomedi soils are in positions on the landscape similar to those of the Amery soil. They formed in sandy deposits over sand and gravel. Included soils make up 10 to 15 percent of the unit.

Permeability and the available water capacity are moderate in the Amery soil. The organic matter content is moderately low or moderate in the surface layer.

Most areas are wooded. A few are used as pasture. Because of a very severe hazard of water erosion, this soil is not suited to cultivated crops. It is poorly suited to pasture because of the hazard of erosion and the difficulty in operating machinery on these steep and very steep slopes. In some of the less sloping areas, the pasture can be renovated and improved. The native vegetation generally is of poor quality for forage.

This soil is suited to trees. The erosion hazard and the equipment limitation are management concerns. Planting on the contour and carefully locating skid roads during harvest minimize erosion. Seedling survival on the steeper slopes facing south or west can be improved by careful planting of vigorous nursery stock. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

This soil generally is not suitable as a site for septic tank absorption fields, dwellings, or local roads and streets, mainly because of the slope. Overcoming this limitation is difficult. A better suited site should be considered.

The land capability classification is VIIe. The woodland ordination symbol is 4R.

AnB—Antigo silt loam, 1 to 6 percent slopes. This deep, nearly level and gently sloping, well drained soil is in plane or slightly convex areas on outwash plains and stream terraces. Individual areas are irregular in shape and generally range from 10 to 100 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 10 inches thick. The subsurface layer is mostly brown silt loam about 6 inches thick. The subsoil is about 16 inches thick. It is mostly dark yellowish brown and dark brown, friable silt loam in the upper part and reddish brown, friable sandy loam in the lower part. The substratum to a depth of about 60 inches is brown, stratified sand and gravel. In places it has little or no gravel. In some areas the slope is more than 6 percent.

Included with this soil in mapping are small areas of the moderately well drained Brill and well drained Rosholt soils. Brill soils are in the slightly lower positions on the landscape. Rosholt soils have a loamy mantle. They are in the slightly higher positions on the landscape. Included soils make up 5 to 10 percent of the unit.

Permeability is moderate in the subsoil of the Antigo soil and rapid or very rapid in the substratum. The available water capacity is moderate. The organic matter content is moderately low or moderate in the surface layer. This layer is friable and can be easily tilled, but it tends to crust and puddle after hard rains or if it is tilled when too wet. The rooting depth of most crops is limited by droughtiness in the sand and gravel substratum.

Most areas are used as cropland. A few are used as pasture or woodland. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, water erosion is a slight or moderate hazard. It can be controlled by contour farming, contour stripcropping, conservation tillage, and grassed waterways. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazard of erosion.

A cover of pasture plants is effective in controlling erosion. The surface layer is subject to crusting, which restricts the emergence of the plants. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, pasture rotation, measures that improve fertility, and restricted use during wet periods help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest.

This vegetation can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

This soil is suited to dwellings. It readily absorbs the effluent in septic tank absorption fields. It does not adequately filter the effluent, however, because of the rapid or very rapid permeability in the substratum. The poor filtering capacity can result in the pollution of ground water.

Because of low strength and the potential for frost action, this soil is poorly suited to local roads and streets. Low strength can be overcome by replacing the upper part of the soil with coarse textured base material, such as sand or gravel, and by increasing the thickness of the pavement or base material. Installing a subsurface drainage system and replacing the upper part of the soil with coarse textured base material help to prevent the damage caused by frost action.

The land capability classification is IIe. The woodland ordination symbol is 3A.

AnC2—Antigo silt loam, 6 to 12 percent slopes, eroded. This deep, sloping, well drained soil is in convex areas on outwash plains and stream terraces. Individual areas are irregular in shape and generally range from 5 to 15 acres in size.

In most cultivated areas on the crest of hills and the upper side slopes, erosion has removed most of the original surface layer. Typically, the remaining surface layer is dark brown silt loam about 5 inches thick. The subsurface layer is mostly brown silt loam about 8 inches thick. The subsoil is about 15 inches thick. It is dark yellowish brown, friable silt loam in the upper part and dark brown, friable sandy loam in the lower part. The substratum to a depth of about 60 inches is reddish brown, stratified sand and gravel. In places it has little or no gravel. In some areas the slope is less than 6 or more than 12 percent.

Included with this soil in mapping are small areas of the well drained Rosholt soils. These soils have a loamy mantle. They are in the slightly higher positions on the landscape. They make up 10 to 15 percent of the unit.

Permeability is moderate in the subsoil of the Antigo soil and rapid or very rapid in the substratum. The available water capacity is moderate. The organic matter content is moderately low or moderate in the surface layer. This layer is friable and can be easily tilled, but it tends to crust and puddle after hard rains or if it is tilled when too wet. The rooting depth of most crops is limited by droughtiness in the sand and gravel substratum.

Most areas are used as cropland. A few are used as pasture or woodland. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, water erosion is a moderate hazard. It can be controlled by contour farming, contour stripcropping, grassed waterways, and conservation tillage. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazard of erosion.

A cover of pasture plants is effective in controlling erosion. The surface layer is subject to crusting, which restricts the emergence of the plants. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, pasture rotation, measures that improve fertility, and restricted use during wet periods help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

This soil readily absorbs the effluent in septic tank absorption fields. It does not adequately filter the effluent, however, because of the rapid or very rapid permeability in the substratum. The poor filtering capacity can result in the pollution of ground water.

Because of the slope, this soil is only moderately suited to dwellings. This limitation can be overcome by cutting and filling, by installing retaining walls, or by designing the dwellings so that one side of the basement fronts on the lower part of the slope. Also, the dwellings can be constructed in the included areas where the slope is less than 6 percent.

Because of low strength and the potential for frost action, this soil is poorly suited to local roads and streets. Low strength can be overcome by replacing the upper part of the soil with coarse textured base material, such as sand or gravel, and by increasing the thickness of the pavement or base material. Installing a subsurface drainage system and replacing the upper part of the soil with coarse textured base material help to prevent the damage caused by frost action.

The land capability classification is IIIe. The woodland ordination symbol is 3A.

AoA—Arenzville silt loam, 0 to 3 percent slopes. This deep, nearly level and gently sloping, moderately well drained soil is in plane or slightly concave areas on flood plains. It is occasionally flooded for brief periods. Individual areas are elongated and generally range from 5 to 60 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 8 inches thick. The upper substratum is brown, dark grayish brown, and very dark grayish brown silt loam about 30 inches thick. The next 12 inches is a buried layer of very dark gray silt loam. The lower substratum to a depth of about 60 inches is dark grayish brown, mottled silt loam. In places the surface layer is loam. In some areas the slope is more than 3 percent.

Included with this soil in mapping are small areas of the somewhat poorly drained Orion soils in the slightly lower positions on the flood plains. These soils make up 5 to 10 percent of the unit.

Permeability is moderate in the Arenzville soil. The available water capacity is high. The organic matter content is moderately low or moderate in the surface layer. This layer is friable and can be easily tilled, but it tends to crust and puddle after hard rains or if it is tilled when too wet. The depth to the seasonal high water table ranges from 3 to 6 feet.

Most areas are used as cropland. A few are used as pasture. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Dikes and diversions help to prevent flooding. Applying streambank stabilization measures and fencing cattle from streams help to prevent streambank erosion. Applying a system of conservation tillage and returning crop residue to the soil or adding other organic material help to maintain fertility and good tilth, increase the rate of water infiltration, and reduce the hazard of scouring by floodwater.

This soil is suited to pasture. The surface layer is subject to crusting, which restricts the emergence of the plants. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, pasture rotation, measures that improve fertility, and restricted use during wet periods help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

This soil generally is not suitable as a site for septic tank absorption fields, dwellings, or local roads and streets, mainly because of the flooding and the wetness. Overcoming these limitations is difficult. A better suited site should be considered.

The land capability classification is IIw. The woodland ordination symbol is 4A.

ApB—Arland sandy loam, 2 to 6 percent slopes. This moderately deep, gently sloping, well drained soil is on the tops of ridges in the uplands. Individual areas are irregular in shape and generally range from 4 to 20 acres in size.

Typically, the surface layer is very dark grayish brown sandy loam about 10 inches thick. The subsoil is about 24 inches thick. The upper part is dark yellowish brown and dark brown, friable loam; the next part is dark brown, friable sandy loam; and the lower part is reddish brown, very friable loamy sand. The substratum is yellowish red sand about 5 inches thick. Poorly cemented sandstone is at a depth of about 39 inches. In places the surface layer is loam or silt loam. In some areas the slope is more than 6 percent.

Included with this soil in mapping are small areas of the well drained Amery soils. These soils are in positions on the landscape similar to those of the Arland soil. They are underlain by sandy loam till. They make up 5 to 10 percent of the unit.

Permeability is moderate in the upper part of the subsoil in the Arland soil and moderately rapid in the substratum. The available water capacity is low. The organic matter content is moderately low or moderate in the surface layer. This layer is friable and can be easily tilled throughout a wide range of moisture content. The rooting depth of most crops is limited by droughtiness in the sandy lower layers or by the underlying sandstone.

Most areas are used as cropland. A few are used as pasture. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. In most years crop yields are limited by the low available water capacity. If cultivated crops are grown, water erosion is a slight or moderate hazard. Also, the soil is subject to soil blowing. Conservation tillage, grassed waterways, and field windbreaks help to control erosion and soil blowing. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazards of erosion and soil blowing.

A cover of pasture plants is effective in controlling erosion and soil blowing. Overgrazing can cause surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, measures that improve fertility, and pasture rotation help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

Because of the depth to bedrock, this soil is poorly suited to septic tank absorption fields. The absorption field functions adequately if the site is mounded with suitable filtering material.

This soil is suited to local roads and streets. It also is suited to dwellings without basements, but it is only moderately suited to dwellings with basements because of the depth to bedrock. This limitation can be overcome by ripping and excavating the bedrock with suitable power equipment; by adding fill material, which raises the site; or by constructing the dwellings with only partially exposed basements.

The land capability classification is IIe. The woodland ordination symbol is 4A.

ApC2—Arland sandy loam, 6 to 12 percent slopes, eroded. This moderately deep, sloping, well drained soil is on knolls and ridges in the uplands. Individual areas are irregular in shape and generally range from 4 to 40 acres in size.

In most cultivated areas on the crest of hills and the upper side slopes, erosion has removed most of the original surface layer. Typically, the remaining surface layer is very dark grayish brown sandy loam about 7 inches thick. The subsoil is about 22 inches thick. It is dark brown and friable. The upper part is sandy loam, the next part is loam, and the lower part is sandy loam. The substratum is reddish yellow sand about 6 inches thick. Poorly cemented sandstone is at a depth of about 35 inches. In places the surface layer is silt loam or loam. In some areas the slope is less than 6 or more than 12 percent.

Included with this soil in mapping are small areas of the well drained Amery and Elkmound soils. Amery soils are underlain by sandy loam till, and Elkmound soils are shallow over sandstone. Both of these soils are in positions on the landscape similar to those of the Arland soil. They make up 12 to 15 percent of the unit.

Permeability is moderate in the upper part of the subsoil in the Arland soil and moderately rapid in the substratum. The available water capacity is low. The organic matter content is moderately low or moderate in the surface layer. This layer is friable and can be easily tilled throughout a wide range of moisture content. The rooting depth of most crops is limited by droughtiness in the sandy substratum or by the underlying sandstone.

Most areas are used as cropland. A few are used as pasture. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. In most years crop yields are limited by the low available water capacity. If cultivated crops are grown, water erosion is a moderate hazard. Also, the soil is subject to soil blowing. Conservation tillage, field windbreaks, contour farming, and contour stripcropping help to control erosion and soil blowing. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazards of erosion and soil blowing.

A cover of pasture plants is effective in controlling erosion and soil blowing. Overgrazing can cause surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, measures that improve fertility, and pasture rotation help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

Because of the depth to bedrock, this soil is poorly suited to septic tank absorption fields. The absorption field functions adequately if the site is mounded with suitable filtering material.

Because of the slope, this soil is only moderately suited to dwellings. This limitation can be overcome by cutting and filling, by installing retaining walls, or by designing the dwellings so that one side of the basement fronts on the lower part of the slope. Also, the dwellings can be constructed in the included areas where the slope is less than 6 percent. The depth to bedrock is a limitation on sites for dwellings with basements. It can be overcome by ripping and excavating the bedrock with suitable power equipment; by adding fill material, which raises the site; or by constructing the dwellings with only partially exposed basements.

Because of the slope, this soil is only moderately suited to local roads and streets. This limitation can be overcome by shaping the roadway through cutting and filling. Also, the road can be built in the less sloping areas.

The land capability classification is IIIe. The woodland ordination symbol is 4A.

ApD2—Arland sandy loam, 12 to 20 percent slopes, eroded. This moderately deep, moderately steep, well drained soil is on knolls and ridges in the uplands. Individual areas are irregular in shape and generally range from 4 to 60 acres in size.

In most cultivated areas on the crest of hills and the upper side slopes, erosion has removed most of the original surface layer. Typically, the remaining surface layer is dark grayish brown sandy loam about 7 inches thick. The subsoil is about 22 inches thick. The upper part is reddish brown, friable sandy loam; the next part is reddish brown, friable loam; and the lower part is strong brown, very friable loamy sand. Poorly cemented sandstone is at a depth of about 29 inches. In places the surface layer is silt loam or loam. In some areas the slope is less than 12 or more than 20 percent.

Included with this soil in mapping are small areas of the well drained Amery and Elkmound soils. Amery soils are underlain by sandy loam till, and Elkmound soils are shallow over sandstone. Both of these soils are in positions on the landscape similar to those of the Arland soil. They make up 10 to 15 percent of the unit.

Permeability is moderate in the upper part of the subsoil in the Arland soil and moderately rapid in the substratum. The available water capacity is low. The organic matter content is moderately low or moderate in the surface layer. This layer is friable and can be easily tilled throughout a wide range of moisture content. The rooting depth of most crops is limited by droughtiness in the sandy part of the subsoil or by the underlying sandstone.

Most areas are used as cropland or pasture. A few are wooded. This soil is suited to corn and small grain and to grasses and legumes for hay and pasture. In most years crop yields are limited by the low available water capacity. If cultivated crops are grown, water erosion is a severe hazard. Also, the soil is subject to soil blowing. Contour farming, contour stripcropping, crop rotations that include grasses and legumes, and conservation tillage help to control erosion and soil blowing. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazards of erosion and soil blowing.

A cover of pasture plants is effective in controlling erosion and soil blowing. Overgrazing can cause surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, pasture rotation, measures that improve fertility, and timely deferment of grazing help to keep the pasture in good condition.

This soil is suited to trees. The erosion hazard and the equipment limitation are management concerns. Planting on the contour and carefully locating skid roads during harvest minimize erosion. Seedling survival on the steeper slopes facing south or west can be improved by careful planting of vigorous nursery stock. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

Because of the depth to bedrock and the slope, this soil is poorly suited to septic tank absorption fields. The depth to bedrock can be overcome by mounding the site with suitable filtering material. The slope can be overcome by cutting and filling or by installing a trench absorption system on the contour.

Because of the slope, this soil is poorly suited to dwellings. This limitation can be overcome by cutting and filling or by installing retaining walls. Also, the dwelling can be designed so that one side of the basement fronts on the lower part of the slope.

Because of the slope, this soil is poorly suited to local roads and streets. This limitation can be overcome by shaping the roadway through cutting and filling. Also, the road can be built in the less sloping areas.

The land capability classification is IVe. The woodland ordination symbol is 4R.

AsB—Arland loam, 2 to 6 percent slopes. This moderately deep, gently sloping, well drained soil is on the tops of ridges in the uplands. Individual areas are irregular in shape and generally range from 4 to 20 acres in size.

Typically, the surface layer is dark grayish brown loam about 7 inches thick. The subsurface layer is brown loam about 4 inches thick. The subsoil is about 18 inches thick. It is dark yellowish brown and brown, friable loam in the upper part and strong brown, very friable loamy sand in the lower part. The substratum is reddish yellow sand about 5 inches thick. Poorly cemented sandstone is at a depth of about 34 inches. In places the subsoil is sandy clay loam. In some areas the surface layer is silt loam or sandy loam. In other areas the slope is more than 6 percent.

Included with this soil in mapping are small areas of the well drained Northfield and Santiago soils. Northfield soils are shallow over sandstone. They are in the slightly higher positions on the landscape. Santiago soils are underlain by sandy loam till. They are in the slightly lower positions on the landscape. Included soils make up 5 to 10 percent of the unit.

Permeability is moderate in the upper part of the subsoil in the Arland soil and moderately rapid in the substratum. The available water capacity is moderate. The organic matter content is moderately low or moderate in the surface layer. This layer is friable and can be easily tilled, but it tends to crust and puddle after hard rains or if it is tilled when too wet. The rooting depth of most crops is limited by droughtiness in the sandy lower layers or by the underlying sandstone.

Most areas are used as cropland. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, water erosion is a slight or moderate hazard. It can be controlled by contour farming, contour stripcropping, conservation tillage, and grassed waterways. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazard of erosion.

A cover of pasture plants is effective in controlling erosion. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, pasture rotation, measures that improve fertility, and timely deferment of grazing help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

Because of the depth to bedrock, this soil is poorly suited to septic tank absorption fields. The absorption field functions adequately if the site is mounded with suitable filtering material.

This soil is suited to local roads and streets. It also is suited to dwellings without basements, but it is only moderately suited to dwellings with basements because of the depth to bedrock. This limitation can be overcome by ripping and excavating the bedrock with suitable power equipment; by adding fill material, which raises the site; or by constructing the dwellings with only partially exposed basements.

The land capability classification is IIe. The woodland ordination symbol is 4A.

AsC2—Arland loam, 6 to 12 percent slopes, eroded. This moderately deep, sloping, well drained soil is on knolls and ridges in the uplands. Individual areas are irregular in shape and generally range from 4 to 40 acres in size.

In most cultivated areas on the crest of hills and the upper side slopes, erosion has removed most of the original surface layer. Typically, the remaining surface layer is dark brown loam about 9 inches thick. The subsoil is about 17 inches thick. It is dark yellowish brown, friable loam in the upper part and dark brown, friable sandy loam in the lower part. The substratum is dark brown loamy sand about 10 inches thick. Poorly cemented sandstone is at a depth of about 36 inches. In places the subsoil is sandy clay loam. In some areas the surface layer is silt loam or sandy loam. In other areas the slope is less than 6 or more than 12 percent.

Included with this soil in mapping are small areas of the well drained Amery and Northfield soils in the slightly higher positions on the landscape. Amery soils are underlain by sandy loam till. Northfield soils are shallow over sandstone. Included soils make up 5 to 15 percent of the unit.

Permeability is moderate in the upper part of the subsoil in the Arland soil and moderately rapid in the substratum. The available water capacity is moderate. The organic matter content is moderately low or moderate in the surface layer. This layer is friable and can be easily tilled, but it tends to crust and puddle after hard rains or if it is tilled when too wet. The rooting depth of most crops is limited by droughtiness in the sandy substratum or by the underlying sandstone.

Most areas are used as cropland. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, water erosion is a moderate hazard. It can be controlled by contour farming, contour stripcropping, grassed waterways, and conservation tillage. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazard of erosion.

A cover of pasture plants is effective in controlling erosion. The surface layer is subject to crusting, which restricts the emergence of the plants. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, pasture rotation, measures that improve fertility, and restricted use during wet periods help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

Because of the depth to bedrock, this soil is poorly suited to septic tank absorption fields. The absorption field functions adequately if the site is mounded with suitable filtering material.

Because of the slope, this soil is only moderately suited to dwellings. This limitation can be overcome by cutting and filling, by installing retaining walls, or by designing the dwellings so that one side of the basement fronts on the lower part of the slope. Also, the dwellings can be constructed in the included areas where the slope is less than 6 percent. The depth to bedrock is a limitation on sites for dwellings with basements. It can be overcome by ripping and excavating the bedrock with suitable power equipment; by adding fill material, which raises the site; or by constructing the dwellings with only partially exposed basements.

Because of the slope, this soil is only moderately suited to local roads and streets. This limitation can be overcome by shaping the roadway through cutting and filling. Also, the road can be built in the less sloping areas.

The land capability classification is IIIe. The woodland ordination symbol is 4A.

AsD2—Arland loam, 12 to 20 percent slopes, eroded. This moderately deep, moderately steep, well drained soil is on knolls and ridges in the uplands. Individual areas are irregular in shape and generally range from 4 to 60 acres in size.

In most cultivated areas on the crest of hills and the upper side slopes, erosion has removed most of the original surface layer. Typically, the remaining surface layer is very dark grayish brown loam about 6 inches thick. The subsoil is about 19 inches thick. It is dark brown and dark yellowish brown, friable sandy loam in the upper part and dark yellowish brown, very friable loamy sand in the lower part. The substratum is brownish yellow sand about 13 inches thick. Poorly cemented sandstone is at a depth of about 38 inches. In places the surface layer is silt loam or sandy loam. In some areas the slope is less than 12 or more than 20 percent.

Included with this soil in mapping are small areas of the well drained Amery and Elkmound soils. Amery soils are underlain by sandy loam till, and Elkmound soils are shallow over sandstone. Both of these soils are in positions on the landscape similar to those of the Arland soil. They make up 10 to 15 percent of the unit.

Permeability is moderate in the upper part of the subsoil in the Arland soil and moderately rapid in the substratum. The available water capacity is moderate. The organic matter content is moderately low or moderate in the surface layer. This layer is friable and can be easily tilled, but it tends to crust and puddle after hard rains or if it is tilled when too wet. The rooting depth of most crops is limited by droughtiness in the sandy lower layers or by the underlying sandstone.

Most areas are used as cropland or pasture. A few are wooded. This soil is suited to corn and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, water erosion is a severe hazard. It can be controlled by contour farming, contour stripcropping, crop rotations that include grasses and legumes, and conservation tillage. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazard of erosion.

A cover of pasture plants is effective in controlling erosion. Overgrazing can cause surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, pasture rotation, measures that improve fertility, and timely deferment of grazing help to keep the pasture in good condition.

This soil is suited to trees. The erosion hazard, the equipment limitation, and seedling mortality are management concerns. Planting on the contour and carefully locating skid roads during harvest minimize erosion. Seedling survival on the steeper slopes facing south or west can be improved by careful planting of vigorous nursery stock. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

Because of the depth to bedrock and the slope, this soil is poorly suited to septic tank absorption fields. The depth to bedrock can be overcome by mounding the site with suitable filtering material. The slope can be overcome by cutting and filling or by installing a trench absorption system on the contour.

Because of the slope, this soil is poorly suited to dwellings. This limitation can be overcome by cutting and filling or by installing retaining walls. Also, the dwelling can be designed so that one side of the basement fronts on the lower part of the slope.

Because of the slope, this soil is poorly suited to local roads and streets. This limitation can be overcome by shaping the roadway through cutting and filling. Also, the road can be built in the less sloping areas.

The land capability classification is IVe. The woodland ordination symbol is 4R.

Au—Auburndale silt loam, 0 to 2 percent slopes. This deep, nearly level, poorly drained soil is on plane and concave slopes in drainageways and depressions on ground moraines. It is subject to ponding. Individual areas are elongated or irregular in shape and generally range from 10 to 150 acres in size.

Typically, the surface layer is very dark gray silt loam about 6 inches thick. The subsurface layer is light brownish gray and grayish brown, mottled silt loam about 10 inches thick. The subsoil is about 29 inches thick. It is mostly grayish brown, gray, and brown, mottled, friable silt loam in the upper part and dark reddish brown, mottled, friable loam in the lower part. The substratum to a depth of about 60 inches is reddish brown sandy loam. In places stones are on the surface.

Included with this soil in mapping are small areas of the somewhat poorly drained Almena and poorly drained and very poorly drained Cable soils. Almena soils are in the slightly higher positions on the landscape. Cable soils are in positions similar to those of the Auburndale soil. Their silty mantle is thinner than that of the Auburndale soil. Included soils make up 5 to 10 percent of the unit.

Permeability is moderately slow or moderate in the subsoil of the Auburndale soil and moderate in the substratum. The available water capacity is high. The organic matter content is high or very high in the surface layer. The rooting depth of most plants is limited by a seasonal high water table, which is near or above the surface in undrained areas.

Most areas of this soil are used as unimproved pasture or as woodland. Undrained areas generally are not suited to cultivated crops because of the wetness and the frost hazard. Drained areas are suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. The number of frost-free days per growing season is limited. Planting early maturing crop varieties or growing corn for silage helps to overcome the frost hazard.

This soil is poorly suited to pasture unless it is drained. Establishing or maintaining improved pasture is difficult because of the wetness. Grazing is limited to the short periods when the soil is dry. The native vegetation generally is of poor quality for forage.

This soil is suited to trees. Seedling mortality and the windthrow hazard are management concerns. Because of the wetness, hand planting or machine planting on prepared ridges generally is needed if natural regeneration is unreliable. Selection of vigorous nursery stock for planting reduces the seeding mortality rate. Harvesting is frequently limited to periods when the ground is frozen. Harvesting by clearcut or area-selection methods helps to prevent windthrow of the remaining trees. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

This soil generally is not suitable as a site for septic tank absorption fields, dwellings, or local roads and streets, mainly because of the ponding. Overcoming this hazard is difficult. A better suited site should be considered.

The land capability classification is VIw in undrained areas. The woodland ordination symbol is 2W.

Ba—Barronett silt loam, 0 to 2 percent slopes. This deep, nearly level, poorly drained and very poorly drained soil is in plane or slightly concave areas on glacial lake plains. It is subject to ponding and rare flooding. Individual areas are irregular in shape and generally range from 20 to 300 acres in size.

Typically, the surface layer is very dark gray, mottled silt loam about 9 inches thick. The subsurface layer is dark gray and grayish brown, mottled silt loam about 9 inches thick. The subsoil is about 22 inches thick. It is gray and pinkish gray, mottled, friable silt loam. The substratum to a depth of about 60 inches is gray, mottled silt loam that has a few thin strata of very fine sand.

Included with this soil in mapping are small areas of the Barronett soils that are ponded for long periods and have a mucky surface layer. These soils are in the lower positions on the landscape. Also included are small areas of the somewhat poorly drained Comstock soils in the slightly higher positions. Included soils make up 5 to 10 percent of the unit.

Permeability is moderately slow or moderate in this Barronett soil. The available water capacity is high. The organic matter content is moderate or high in the surface layer. This layer is friable but tends to crust or puddle after hard rains or if it is tilled when too wet. The rooting depth of most crops is limited by a seasonal high water table, which is near or above the surface in undrained areas.

Most areas are used as cropland. Some are used as wetland wildlife habitat. A few are used as pasture or woodland.

If drained, this soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Dikes and diversions help to prevent flooding and ponding. Land smoothing, diversions, and interceptor subsurface drains help to remove excess water. Restrictive soil layers may hinder the movement of water to tile drains. If drainage tile is installed, silt and fine sand enter the tile lines unless a suitable filter is used to cover the tile. Applying a system of conservation tillage and returning crop residue to the soil or adding other organic material help to maintain fertility and good tilth and increase the rate of water infiltration. The number of frost-free days per growing season is limited. Planting early maturing crop varieties or growing corn for silage help to overcome the frost hazard.

This soil is suited to pasture. The surface layer is subject to crusting, which restricts the emergence of the plants. Alfalfa is generally short lived because of the seasonal high water table, the flooding, and the winterkill caused by frost heave. Red clover is generally grown. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable species. Proper stocking rates, measures that improve fertility, pasture rotation, and timely deferment of grazing help to keep the pasture in good condition.

This soil is poorly suited to trees. The trees grow so slowly and are so poorly shaped that they are barely merchantable at best. The equipment limitation, seedling mortality, and the windthrow hazard are management concerns. Because of the wetness, hand planting or machine planting on prepared ridges generally is needed if natural regeneration is unreliable. Selection of vigorous nursery stock for planting reduces the seedling mortality rate. Harvesting is frequently limited to periods when the ground is frozen. Harvesting by clearcut or area-selection methods helps to prevent windthrow of the remaining trees. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

This soil generally is not suitable as a site for septic tank absorption fields, dwellings, or local roads and streets, mainly because of the flooding and the ponding. Overcoming these hazards is difficult. A better suited site should be considered.

The land capability classification is IIIw in drained areas. The woodland ordination symbol is 2W.

Bb—Barronett mucky silt loam, ponded, 0 to 2 percent slopes. This deep, nearly level, very poorly drained soil is in plane or concave areas on glacial lake plains. It is subject to ponding and is frequently flooded. The ponding and flooding last for long periods. Individual areas are irregular in shape and generally range from 3 to 100 acres in size.

Typically, about 1 inch of a very dark grayish brown, undecomposed organic material is at the surface. The surface layer is very dark gray, mottled mucky silt loam about 8 inches thick. The subsoil is gray, greenish gray, and light brownish gray, mottled, friable silt loam about 22 inches thick. The substratum to a depth of about 60 inches is dark gray, mottled silt loam that has strata of very fine sand less than 1 inch thick.

Included with this soil in mapping are small areas of the Barronett soils that are not ponded for long periods and have a surface layer of silt loam. These soils are in the slightly higher positions on the landscape. Also included are small areas of the very poorly drained Beseman soils, which formed in organic material in depressions on the lower parts of the landscape. Included soils make up 1 to 5 percent of the unit.

Permeability is moderately slow or moderate in this Barronett soil. The available water capacity is very high. The organic matter content is high or very high in the surface layer. The rooting depth of most plants is limited by a seasonal high water table, which is near or above the surface in undrained areas.

Most areas are used as unimproved pasture. A few are wooded. Because of the wetness, a scarcity of suitable drainage outlets, the flooding, and the hazard of frost late in spring and early in fall, this soil generally is not suited to cultivated crops. It is poorly suited to pasture unless it is drained. Establishing or maintaining improved pasture is difficult because of the wetness. The native vegetation is generally of poor quality for forage. Grazing is limited to the short periods when the soil is dry.

This soil is poorly suited to trees. The trees grow so slowly and are so poorly shaped that they are barely merchantable at best. The equipment limitation, seedling mortality, and the windthrow hazard are management concerns. Because of the wetness, hand planting or machine planting on prepared ridges generally is needed if natural regeneration is unreliable. Selection of vigorous nursery stock for planting reduces the seedling mortality rate. Harvesting is frequently limited to periods when the ground is frozen. Harvesting by clearcut or area-selection methods helps to prevent windthrow of the remaining trees. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

This soil generally is not suitable as a site for septic tank absorption fields, dwellings, or local roads and streets, mainly because of the flooding and the ponding. Overcoming these hazards is difficult. A better suited site should be considered.

The land capability classification is VIw in undrained areas. The woodland ordination symbol is 2W.

Be—Beseman muck, 0 to 1 percent slopes. This deep, nearly level, very poorly drained soil is in depressions on ground moraines. It is subject to ponding and rare flooding. Individual areas are elongated and generally range from 10 to 120 acres in size.

Typically, the upper 20 inches is brown, dark brown, and black muck. The substratum to a depth of about 60 inches is gray silt loam.

Included with this soil in mapping are small areas of the very poorly drained Barronett soils that are ponded for long periods and that formed mostly in silty deposits in the slightly higher positions on the landscape. Also included are small areas of the very poorly drained Greenwood soils in positions similar to those of the Beseman soil. These soils formed in organic material more than 51 inches thick. Included soils make up 5 to 15 percent of the unit.

Permeability is moderately rapid in the organic part of the Beseman soil and moderately slow in the substratum. The available water capacity is very high. The organic matter content also is very high. The rooting depth of most plants is limited by a seasonal high water table, which is near or above the surface in undrained areas.

Most areas support wetland vegetation. Because of the wetness, a scarcity of suitable drainage outlets, the hazard of frost late in spring and early in fall, and an extremely acid reaction, this soil generally is not suited to cultivated crops or to pasture. If drained and cultivated, it is subject to burning and subsidence. Also, it is subject to soil blowing.

This soil is poorly suited to trees. The trees grow so poorly and are so poorly shaped that they are barely merchantable at best. The equipment limitation, seedling mortality, and the windthrow hazard are management concerns. Because of the wetness, hand planting or machine planting on prepared ridges generally is needed if natural regeneration is unreliable. Selection of vigorous nursery stock for planting reduces the seedling mortality rate. Harvesting is frequently limited to periods when the ground is frozen. Harvesting by clearcut or area-selection methods helps to prevent windthrow of the remaining trees. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation.

This soil generally is not suitable as a site for septic tank absorption fields, dwellings, or local roads and streets, mainly because of the flooding and the ponding. Overcoming these hazards is difficult. A better suited site should be considered.

The land capability classification is VIIw in undrained areas. The woodland ordination symbol is 2W.

BlA—Billett sandy loam, 0 to 2 percent slopes. This deep, nearly level, well drained soil is in plane areas on outwash plains. Individual areas are irregular in shape and generally range from 5 to 25 acres in size.

Typically, the surface layer is very dark grayish brown sandy loam about 9 inches thick. The subsurface layer is brown sandy loam about 3 inches thick. The subsoil is dark brown, friable sandy loam about 24 inches thick. The substratum to a depth of about 60 inches is yellowish brown sand. In places the surface layer is loam.

Included with this soil in mapping are small areas of the moderately well drained Billett and well drained Meridian soils. The wetter Billett soils are in depressions. Meridian soils are in positions on the landscape similar to those of the well drained Billett soil. They have more clay in the surface layer and subsoil than the Billett soil. Included soils make up 5 to 15 percent of the unit.

Permeability is moderately rapid in the subsoil of this Billett soil and rapid in the substratum. The available water capacity is moderate. The organic matter content is moderately low in the surface layer. This layer is friable and can be easily tilled throughout a wide range of moisture content. The rooting depth of most crops is limited by droughtiness in the sandy substratum.

Most areas are used as cropland. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, the soil is subject to soil blowing. Also, it is moderately droughty. Conservation tillage, winter cover crops, and field windbreaks help to control soil blowing. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazard of soil blowing.

A cover of pasture plants is effective in controlling soil blowing. Overgrazing can cause surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, measures that improve fertility, and pasture rotation help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

This soil readily absorbs the effluent in septic tank absorption fields. It does not adequately filter the effluent, however, because of the rapid permeability in the substratum. The poor filtering capacity can result in the pollution of ground water. The soil is suited to dwellings. It is only moderately suited to local roads and streets because of the potential for frost action. Replacing the upper part of the soil with coarse textured base material, such as sand or gravel, helps to prevent the damage caused by frost action.

The land capability classification is IIIs. The woodland ordination symbol is 4A.

BIB—Billett sandy loam, 2 to 6 percent slopes. This deep, gently sloping, well drained soil is in slightly convex areas on outwash plains. Individual areas are irregular in shape and generally range from 5 to 100 acres in size.

Typically, the surface layer is very dark grayish brown sandy loam about 9 inches thick. The subsoil is about 25 inches thick. It is dark brown, friable sandy loam in the upper part and dark brown, very friable loamy sand in the lower part. The substratum to a depth of about 60 inches is strong brown and yellowish brown, stratified fine sand and sand. In places the surface layer is loam or is thinner and darker. In some areas the slope is less than 2 or more than 6 percent.

Included with this soil in mapping are small areas of the moderately well drained Billett and well drained Meridian soils. The wetter Billett soils are in slight depressions on the lower parts of the landscape. Meridian soils are in positions on the landscape similar to those of the well drained Billett soil. They have more clay in the surface layer and subsoil than the Billett soil. Included soils make up 5 to 15 percent of the unit.

Permeability is moderately rapid in the subsoil of this Billett soil and rapid in the substratum. The available water capacity is moderate. The organic matter content is moderately low in the surface layer. This layer is friable and can be easily tilled throughout a wide range of moisture content. The rooting depth of most crops is limited by droughtiness.

Most areas are used as cropland. A few are used as pasture. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, water erosion is a slight or moderate hazard. Also, the soil is subject to soil blowing and is moderately droughty. Conservation tillage and field windbreaks help to control erosion and soil blowing. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazards of erosion and soil blowing.

A cover of pasture plants is effective in controlling erosion and soil blowing. Overgrazing can cause surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, measures that improve fertility, and pasture rotation help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

This soil readily absorbs the effluent in septic tank absorption fields. It does not adequately filter the effluent, however, because of the rapid permeability in the substratum. The poor filtering capacity can result in the pollution of ground water. The soil is suited to dwellings. It is only moderately suited to local roads and streets because of the potential for frost action. Replacing the upper part of the soil with coarse textured base material, such as sand or gravel, helps to prevent the damage caused by frost action.

The land capability classification is IIIs. The woodland ordination symbol is 4A.

BIC2—Billet sandy loam, 6 to 12 percent slopes, eroded. This deep, sloping, well drained soil is on convex side slopes and knolls on outwash plains.

Individual areas are irregular in shape and generally range from 4 to 40 acres in size.

In most cultivated areas on the crest of hills and the upper side slopes, erosion has removed most of the original surface layer. Typically, the remaining surface layer is very dark grayish brown sandy loam about 8 inches thick. The subsoil is about 22 inches thick. It is dark brown, friable sandy loam in the upper part and dark brown, very friable loamy sand in the lower part. The substratum to a depth of about 60 inches is yellowish brown, stratified sand and gravel. In places the surface layer is loam. In some areas the slope is less than 6 or more than 12 percent.

Included with this soil in mapping are small areas of the well drained and somewhat excessively drained Eleva soils. These soils are underlain by sandstone. They are in the slightly higher positions on the landscape. They make up 5 to 15 percent of the unit.

Permeability is moderately rapid in the subsoil of the Billett soil and rapid in the substratum. The available water capacity is low. The organic matter content is moderately low in the surface layer. This layer is friable and can be easily tilled throughout a wide range of moisture content. The rooting depth of most crops is limited by droughtiness in the sandy substratum.

Most areas are used as cropland. A few are used as pasture. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. In most years crop yields are limited by the low available water capacity. If cultivated crops are grown, water erosion is a moderate hazard. Also, the soil is subject to soil blowing. Conservation tillage, field windbreaks, contour farming, and contour stripcropping help to control erosion and soil blowing. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazards of erosion and soil blowing.

A cover of pasture plants is effective in controlling erosion and soil blowing. Overgrazing can cause surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, measures that improve fertility, and pasture rotation help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

This soil readily absorbs the effluent in septic tank absorption fields. It does not adequately filter the effluent, however, because of the rapid permeability in the substratum. The poor filtering capacity can result in the pollution of ground water.

Because of the slope, this soil is only moderately suited to dwellings. This limitation can be overcome by cutting and filling, by installing retaining walls, or by designing the dwellings so that one side of the basement fronts on the lower part of the slope. Also, the dwellings can be constructed in the included areas where the slope is less than 6 percent.

Because of the slope and the potential for frost action, this soil is only moderately suited to local roads and streets. The slope can be overcome by shaping the roadway through cutting and filling. Also, the road can be built in the less sloping areas. Replacing the upper part of the soil with coarse textured base material, such as sand or gravel, helps to prevent the damage caused by frost action.

The land capability classification is IIIe. The woodland ordination symbol is 4A.

BmA—Billett sandy loam, moderately well drained, 0 to 3 percent slopes. This deep, nearly level and gently sloping soil is in plane or slightly concave areas on outwash plains. Individual areas are irregular in shape and generally range from 5 to 60 acres in size.

Typically, the surface layer is very dark grayish brown sandy loam about 8 inches thick. The subsurface layer is brown sandy loam about 6 inches thick. The subsoil is friable sandy loam about 23 inches thick. It is yellowish brown and dark yellowish brown in the upper part and dark brown and mottled in the lower part. The substratum to a depth of about 60 inches is brownish yellow, mottled sand. In places the surface layer is loam. In some areas the substratum has loamy strata as much as 1 inch thick.

Included with this soil in mapping are small areas of the well drained Billett and somewhat poorly drained Shiffer soils. The well drained Billett soils are in the slightly higher positions on the landscape. Shiffer soils are in the slightly lower positions. Included soils make up 5 to 10 percent of the unit.

Permeability is moderately rapid in the subsoil of this Billett soil and rapid in the substratum. The available water capacity is moderate. The organic matter content is moderately low in the surface layer. This layer is friable and can be easily tilled throughout a wide range of moisture content. The rooting depth of most crops is limited by droughtiness in the sandy substratum. The depth to the seasonal high water table ranges from 3 to 6 feet.

Most areas are used as cropland. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, the soil is subject to soil blowing. Also, it is moderately droughty. Conservation tillage, winter cover crops, and field windbreaks help to control soil blowing. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazard of soil blowing.

A cover of pasture plants is effective in controlling soil blowing. Overgrazing can cause surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, measures that improve fertility, and pasture rotation help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

This soil readily absorbs the effluent in septic tank absorption fields. It does not adequately filter the effluent, however, because of the rapid permeability in the substratum. The poor filtering capacity can result in the pollution of ground water. Wetness also is a limitation. Mounding the site with suitable filtering material helps to overcome the wetness and the poor filtering capacity. Also, the effluent can be pumped to an absorption field on a better suited soil in some nearby areas.

This soil is suited to dwellings without basements. Because of the wetness, however, it is only moderately suited to dwellings with basements. This limitation can be overcome by installing tile drains around foundations and providing gravity outlets or other dependable outlets and by constructing the foundations on coarse textured fill material above the level of wetness.

Because of the potential for frost action, this soil is only moderately suited to local roads and streets. Replacing the upper part of the soil with coarse textured base material, such as sand or gravel, helps to prevent the damage caused by frost action.

The land capability classification is IIIs. The woodland ordination symbol is 4A.

BoE—Boone fine sand, 20 to 45 percent slopes. This moderately deep, steep and very steep, excessively drained soil is on ridgetops and the sides of valleys in the uplands. Individual areas are irregular in shape and generally range from 10 to 250 acres in size.

Typically, the surface layer is very dark gray fine sand about 2 inches thick. The substratum is about 20 inches of brown and light yellowish brown fine sand and sand. Poorly cemented sandstone is at a depth of about 22 inches.

Included with this soil in mapping are small areas of the well drained and somewhat excessively drained Eleva and well drained Elkmound and Northfield soils. Eleva soils formed mostly in loamy material and sandstone residuum. They are in the lower positions on the landscape. Elkmound and Northfield soils are on the higher ridgetops. Elkmound soils formed in loamy deposits and are shallow over sandstone. Northfield soils formed in silty deposits and are shallow over sandstone. Included soils make up 10 to 20 percent of the unit.

Permeability is rapid in the Boone soil. The available water capacity is very low. Natural fertility is low. The organic matter content is very low or low in the surface layer. The rooting depth of most plants is limited by droughtiness and by the underlying sandstone.

Most areas are wooded. Because of a very severe hazard of erosion, drought, and soil blowing, this soil is not suited to cultivated crops and is poorly suited to pasture. Operating machinery on these steep and very steep slopes is difficult. In some of the less sloping areas, the pasture can be renovated and improved. The native vegetation generally is of poor quality for forage.

This soil is poorly suited to trees. The trees grow slowly and are poorly shaped. The erosion hazard, the equipment limitation, and seedling mortality are management concerns. Erosion can be controlled by planting on the contour and by carefully locating skid roads. Poor survival of planted trees during dry periods can be offset by careful planting of vigorous nursery stock. Although the production of merchantable wood on this soil may not be profitable, the trees can be very effective in controlling soil blowing and erosion.

This soil generally is not suitable as a site for septic tank absorption fields, dwellings, or local roads and streets, mainly because of the slope. Overcoming this limitation is difficult. A better suited site should be considered.

The land capability classification is VIIs. The woodland ordination symbol is 2R.

BpA—Brill silt loam, 0 to 3 percent slopes. This deep, nearly level and gently sloping, moderately well drained soil is in plane or slightly convex areas on outwash plains and stream terraces. Individual areas are irregular in shape and generally range from 5 to 50 acres in size.

Typically, the surface layer is dark brown silt loam about 8 inches thick. The subsurface layer is mostly brown silt loam about 5 inches thick. The subsoil is about 21 inches thick. The upper part is mostly dark yellowish brown, friable silt loam; the next part is dark yellowish brown, mottled, friable silt loam; and the lower part is brown, mottled, very friable gravelly sandy loam. The substratum to a depth of about 60 inches is dark brown, stratified sand and gravel. In places the slope is more than 3 percent.

Included with this soil in mapping are small areas of the well drained Antigo, somewhat poorly drained Poskin, and moderately well drained Scott Lake soils. Antigo soils are in the slightly higher positions on the landscape. Poskin soils are in the slightly lower positions. Scott Lake soils are in positions similar to those of the Brill soil. They have a loamy surface layer and subsoil. Included soils make up 5 to 15 percent of the unit.

Permeability is moderate in the upper part of the subsoil in the Brill soil and rapid or very rapid in the substratum. The available water capacity is moderate. The organic matter content is moderate in the surface layer. This layer is friable and can be easily tilled, but it tends to crust and puddle after hard rains or if it is tilled when too wet. The rooting depth of most crops is limited by droughtiness in the substratum. The depth to the seasonal high water table ranges from 2.5 to 3.5 feet.

Most areas are used as cropland. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Applying a system of conservation tillage and returning crop residue to the soil or adding other organic material help to maintain fertility and good tilth and increase the rate of water infiltration.

This soil is suited to pasture. The surface layer is subject to crusting, which restricts the emergence of the plants. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, pasture rotation, measures that improve fertility, and restricted use during wet periods help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

This soil readily absorbs the effluent in septic tank absorption fields. It does not adequately filter the effluent, however, because of the rapid permeability in the substratum. The poor filtering capacity can result in the pollution of ground water. Wetness also is a limitation. Mounding the site with suitable filtering material helps to overcome the wetness and the poor filtering capacity. Also, the effluent can be pumped to an absorption field on a better suited soil in some nearby areas.

Because of the shrink-swell potential, this soil is only moderately suited to dwellings. This limitation can be overcome by excavating the soil and replacing it with coarse textured material, such as sand or gravel; by strengthening basement walls; and by installing a subsurface drainage system at or below the basement elevation. The wetness is a limitation on sites for dwellings with basements. It can be overcome by installing tile drains around foundations and providing gravity outlets or other dependable outlets and by constructing the foundations on coarse textured fill material above the level of wetness.

Because of low strength and the potential for frost action, this soil is poorly suited to local roads and streets. Low strength can be overcome by replacing the upper part of the soil with coarse textured base material, such as sand or gravel, and by increasing the thickness of the pavement or base material. Installing a subsurface drainage system and replacing the upper part of the soil with coarse textured base material help to prevent the damage caused by frost action.

The land capability classification is IIs. The woodland ordination symbol is 3A.

BuA—Burkhardt sandy loam, 0 to 3 percent slopes. This deep, nearly level and gently sloping, somewhat excessively drained or excessively drained soil is in plane areas on stream terraces and outwash plains. Individual areas are irregular in shape and generally range from 20 to 400 acres in size.

Typically, the surface layer is about 11 inches thick. It is very dark brown sandy loam in the upper part and dark brown coarse sandy loam in the lower part. The subsoil is about 8 inches thick. It is dark brown, friable coarse sandy loam in the upper part and dark brown, very friable gravelly coarse sand in the lower part. The substratum to a depth of about 60 inches is dark brown and strong brown, stratified coarse sand and gravel. In places the surface layer is loam. In some areas the depth to sand and gravel is more than 24 inches. In other areas the slope is more than 3 percent.

Included with this soil in mapping are small areas of the excessively drained Menahga soils. These soils are sandy throughout. They are in the slightly higher positions on the landscape. They make up 5 to 15 percent of the unit.

Permeability is moderately rapid in the subsoil of the Burkhardt soil and rapid or very rapid in the substratum. The available water capacity is low. The organic matter content is moderate to very high in the surface layer. This layer is very friable and can be easily tilled throughout a wide range of moisture content. The rooting depth of most crops is limited by droughtiness in the sandy part of the subsoil and in the substratum.

Most areas are used as cropland. Some have been planted to pine. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. In most years crop yields are limited by the low available water capacity. If cultivated crops are grown, soil blowing is a hazard. It can be controlled by conservation tillage, winter cover crops, and field windbreaks. Returning crop residue to the soil or adding other organic material reduces the amount of water lost through evaporation, increases the rate of water infiltration, helps to maintain fertility, and reduces susceptibility to soil blowing.

A cover of pasture plants is effective in controlling soil blowing. Overgrazing can cause surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, measures that improve fertility, and pasture rotation help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

This soil is suited to dwellings and to local road and streets. It readily absorbs the effluent in septic tank absorption fields. It does not adequately filter the effluent, however, because of the rapid permeability. The poor filtering capacity can result in the pollution of ground water.

The land capability classification is IIIs. The woodland ordination symbol is 2A.

Cb—Cable silt loam, 0 to 2 percent slopes. This deep, nearly level, poorly drained and very poorly drained soil is in depressions and drainageways on ground moraines. It is subject to ponding. Individual areas are irregular in shape or long and narrow and generally range from 10 to 200 acres in size.

Typically, about 2 inches of very dark grayish brown, undecomposed organic material is at the surface. The surface layer is very dark gray silt loam about 4 inches thick. The subsoil is about 20 inches thick. It is grayish brown, mottled, and friable. It is silt loam in the upper part and loam in the lower part. The substratum to a depth of about 60 inches is dark brown and reddish brown sandy loam. It is mottled in the upper part. In places the substratum is loam. In some areas the content of cobbles and stones in the surface layer is as much as 35 percent.

Included with this soil in mapping are small areas of the very poorly drained Beseman and somewhat poorly drained Magnor soils. Beseman soils formed in 16 to 51 inches of organic material. They are in depressions on the slightly lower parts of the landscape. Magnor soils are in the slightly higher positions on the landscape. Included soils make up 5 to 15 percent of the unit.

Permeability is moderately slow or moderate in the subsoil of the Cable soil and moderately slow in the substratum. The available water capacity is high. The organic matter content is moderate in the surface layer. The rooting depth of most plants is limited by a seasonal high water table, which is near or above the surface in undrained areas.

Most areas of this soil are used as unimproved pasture or support native wetland vegetation. Undrained areas generally are not suited to cultivated crops because of the wetness and the frost hazard. Drained areas are suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. The number of frost-free days per growing season is limited. Planting early maturing corn varieties or cutting the corn for silage helps to overcome the frost hazard.

Unless drained, this soil is poorly suited to pasture. Establishing an improved pasture is difficult because of the wetness. The quality of the native forage plants generally is poor. Grazing is limited to short periods when the soil is dry.

This soil is suited to trees. The equipment limitation, seedling mortality, and the windthrow hazard are management concerns. Because of the wetness, hand planting or machine planting on prepared ridges is generally needed if natural regeneration is unreliable. Selection of vigorous nursery stock for planting reduces the seedling mortality rate. Harvesting is frequently limited to periods when the ground is frozen. Harvesting by clearcut or area-selection methods helps to prevent windthrow of the remaining trees. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

This soil generally is not suitable as a site for septic tank absorption fields, dwellings, or local roads and streets, mainly because of the ponding. Overcoming the hazard is difficult. A better suited site should be considered.

The land capability classification is VIw in undrained areas. The woodland ordination symbol is 2W.

CdB—Campia silt loam, 2 to 6 percent slopes. This deep, gently sloping, well drained soil is in slightly convex areas on glacial lake plains. Individual areas are irregular in shape and generally range from 10 to 100 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 8 inches thick. The subsurface layer is mostly brown silt loam about 11 inches thick. The subsoil is about 23 inches thick. It is mostly reddish brown, friable silt loam in the upper part and reddish brown, firm silty clay loam in the lower part. The substratum to a depth of about 60 inches is reddish brown silt loam.

Included with this soil in mapping are small areas of the moderately well drained Crystal Lake and Spencer and well drained Santiago soils. Crystal Lake soils are in the lower positions on the landscape. Spencer and Santiago soils are in positions similar to those of the Campia soil. Spencer soils formed in silty deposits over sandy loam glacial till. Santiago soils formed in silty and loamy deposits over sandy loam glacial till. Included soils make up 5 to 10 percent of the unit.

Permeability is moderate in the Campia soil. The available water capacity is very high. The organic matter content is moderately low or moderate in the surface layer. This layer is friable and can be easily tilled, but it tends to crust and puddle after hard rains or if it is tilled when too wet.

Most areas are used as cropland or pasture. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, water erosion is a slight or moderate hazard. It can be controlled by terraces, grassed waterways, contour farming, contour stripcropping, and conservation tillage. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazard of erosion.

A cover of pasture plants is effective in controlling erosion. The surface layer is subject to crusting, which restricts the emergence of the plants. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, pasture rotation, measures that improve fertility, and restricted use during wet periods help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

This soil is suited to dwellings. It is only moderately suited to septic tank absorption fields because of the moderate permeability. This limitation can be overcome by constructing a mound of suitable filtering material and possibly by increasing the size of the absorption field.

Because of low strength and the potential for frost action, this soil is poorly suited to local roads and streets. These limitations can be overcome by replacing the upper part of the soil with coarse textured base material, such as sand or gravel. Low strength also can be overcome by increasing the thickness of the pavement or base material.

The land capability classification is IIe. The woodland ordination symbol is 3A.

CdC2—Campia silt loam, 6 to 12 percent slopes, eroded. This deep, sloping, well drained soil is on convex side slopes and knolls on glacial lake plains. Individual areas are irregular in shape and generally range from 5 to 50 acres in size.

In most cultivated areas on the crest of hills and the upper side slopes, erosion has removed most of the original surface layer. Typically, the remaining surface layer is dark brown silt loam about 10 inches thick. The subsurface layer is mostly pale brown silt loam about 4 inches thick. The subsoil is about 20 inches thick. The upper part is mostly reddish brown, friable silt loam; the next part is reddish brown, firm silty clay loam; and the lower part is reddish brown, friable silt loam. The substratum to a depth of about 60 inches is reddish brown silt loam. In places the slope is less than 6 percent or more than 12 percent.

Included with this soil in mapping are small areas of the well drained Otterholt and Santiago soils. Otterholt soils formed in silty deposits over sandy loam glacial till, and Santiago soils formed in silty and loamy deposits over sandy loam glacial till. Both of these soils are in positions on the landscape similar to those of the Campia soil. They make up 10 to 15 percent of the unit.

Permeability is moderate in the Campia soil. The available water capacity is very high. The organic matter content is moderately low or moderate in the surface layer. This layer is friable and can be easily tilled, but it tends to crust and puddle after hard rains or if it is tilled when too wet.

Most areas are used as cropland. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, water erosion is a moderate hazard. It can be controlled by contour farming, contour stripcropping, grassed waterways, and conservation tillage. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazard of erosion.

A cover of pasture plants is effective in controlling erosion. The surface layer is subject to crusting, which restricts the emergence of the plants. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, pasture rotation, measures that improve fertility, and restricted use during wet periods help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

Because of the moderate permeability and the slope, this soil is only moderately suited to septic tank absorption fields. The moderate permeability can be overcome by mounding the site with suitable filtering material. The slope can be overcome by cutting and filling or by installing a trench absorption system on the contour. Also, the absorption field can be installed in the included areas where the slope is less than 6 percent.

Because of the slope, this soil is only moderately suited to dwellings. This limitation can be overcome by cutting and filling, by installing retaining walls, or by designing the dwellings so that one side of the basement fronts on the lower part of the slope. Also, the dwellings can be constructed in the included areas where the slope is less than 6 percent.

Because of low strength and the potential for frost action, this soil is poorly suited to local roads and streets. These limitations can be overcome by replacing the upper part of the soil with coarse textured base material, such as sand or gravel. Low strength also can be overcome by increasing the thickness of pavement or base material.

The land capability classification is IIIe. The woodland ordination symbol is 3A.

CdD2—Campia silt loam, 12 to 20 percent slopes, eroded. This deep, moderately steep, well drained soil is on side slopes on glacial lake plains and terraces. Individual areas are irregular in shape and generally range from 5 to 40 acres in size.

In most cultivated areas on the crest of hills and the upper side slopes, erosion has removed most of the original surface layer Typically, the remaining surface layer is dark brown silt loam about 8 inches thick. The subsurface layer is mostly pinkish gray silt loam about 5 inches thick. The subsoil is about 16 inches thick. It is mostly reddish brown, firm silty clay loam in the upper part and reddish brown, friable silt loam in the lower part. The substratum to a depth of about 60 inches is reddish brown silt loam. In places it is sandy loam. In some areas the depth to sand and gravel is more than 40 inches. In other areas the slope is less than 12 or more than 20 percent.

Included with this soil in mapping are small areas of the well drained Santiago soils. These soils are in positions on the landscape similar to those of Campia soil. They formed in silty and loamy deposits over sandy loam glacial till. They make up 10 to 15 percent of the unit.

Permeability is moderate in the Campia soil. The available water capacity is very high. The organic matter content is moderately low or moderate in the surface layer. This layer is friable and can be easily tilled, but it tends to crust and puddle after hard rains or if it is tilled when too wet.

Most areas are used as cropland or pasture. This soil is suited to corn and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, water erosion is a severe hazard. It can be controlled by contour farming, contour stripcropping, crop rotations that include grasses and legumes, and conservation tillage. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazard of erosion.

A cover of pasture plants is effective in controlling erosion. The surface layer is subject to crusting, which restricts the emergence of the plants. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, measures that improve fertility, and restricted use during wet periods help to keep the pasture in good condition.

This soil is suited to trees. The erosion hazard, the equipment limitation, and seedling mortality are management concerns. Planting on the contour and carefully locating skid roads during harvest minimize erosion. Seedling survival on the steeper slopes facing south or west can be improved by careful planting of vigorous nursery stock. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

Because of the slope, this soil is poorly suited to septic tank absorption fields and dwellings. On sites for septic tank absorption fields, this limitation can be overcome by cutting and filling or by installing a trench absorption system on the contour. On sites for dwellings, it can be overcome by cutting and filling or by installing retaining walls. Also, the dwelling can be designed so that one side of the basement fronts on the lower part of the slope.

Because of low strength, the slope, and the potential for frost action, this soil is poorly suited to local roads and streets. Low strength and frost action can be overcome by replacing the upper part of the soil with coarse textured base material, such as sand or gravel. Low strength also can be overcome by increasing the thickness of the pavement or the base material. The slope can be overcome by shaping the roadway through cutting and filling. Also, the road can be built in the less sloping areas.

The land capability classification is IVe. The woodland ordination symbol is 3R.

CeA—Caryville sandy loam, 0 to 3 percent slopes. This deep, nearly level and gently sloping, well drained soil is in plane areas on flood plains and stream terraces. It is subject to rare flooding. Individual areas are oblong and generally range from 3 to 50 acres in size.

Typically, the surface layer is dark reddish brown sandy loam about 16 inches thick. The next layer is dark reddish brown loamy sand about 4 inches thick. The substratum to a depth of about 60 inches is brown sand. In places the surface layer is loam. In some areas silty or loamy strata are in the substratum.

Included with this soil in mapping are small areas of the somewhat excessively drained Burkhardt soils. These soils have more gravel in the lower part of the subsoil and in the substratum than the Caryville soil. They are in the slightly higher positions on the landscape. Also included are a few small areas of Caryville soils that have mottles in the upper part of the substratum and are moderately well drained. Included soils make up 5 to 15 percent of the unit.

Permeability is moderately rapid in the upper loamy part of this Caryville soil and moderately rapid or rapid in the substratum. The available water capacity is low. The organic matter content is moderately low or moderate in the surface layer. This layer is friable and can be easily tilled throughout a wide range of moisture content. The rooting depth of most crops is limited by droughtiness in the sandy layers.

Most areas are used as cropland. A few are used as pasture. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. In most years crop yields are limited by the low available water capacity. If cultivated crops are grown, soil blowing is a hazard. It can be controlled by conservation tillage and field windbreaks. Dikes and diversions help to prevent flooding. Returning crop residue to the soil or adding other organic material reduces the amount of water lost through evaporation, increases the rate of water infiltration, helps to maintain fertility, and reduces susceptibility to soil blowing.

A cover of pasture plants is effective in controlling soil blowing and erosion. Forage yields are generally low unless fertilizer is applied and the amount of moisture is adequate. Planting early in spring, before the soil has a chance to dry out, helps to overcome the droughtiness. Planting later in the year is likely to result in a poor survival rate. Overgrazing can cause surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Measures that improve fertility, proper stocking rates, and pasture rotation help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

This soil generally is not suitable as a site for septic tank absorption fields, dwellings, or local roads and streets, mainly because of the flooding. Overcoming this hazard is difficult. A better suited site should be considered.

The land capability classification is IIIw. The woodland ordination symbol is 3A.

CkA—Chetek sandy loam, 0 to 2 percent slopes. This deep, nearly level, somewhat excessively drained soil is in plane areas on outwash plains and stream terraces. Individual areas are irregular in shape and generally range from 5 to 40 acres in size.

Typically, the surface layer is very dark grayish brown sandy loam about 7 inches thick. The subsoil is about 12 inches thick. It is dark brown, friable sandy loam in the upper part and dark brown, very friable gravelly sandy loam in the lower part. The substratum to a depth of about 60 inches is yellowish brown, stratified sand and gravel. In places the depth to sand and gravel is more than 20 inches. In some areas the slope is more than 2 percent.

Included with this soil in mapping are small areas of the excessively drained Menahga soils. These soils are sandy throughout. They are in the slightly higher positions on the landscape. They make up 2 to 10 percent of the unit.

Permeability is moderately rapid in the subsoil of the Chetek soil and rapid or very rapid in the substratum. The available water capacity is low. The organic matter content is moderately low or moderate in the surface layer. This layer is friable and can be easily tilled throughout a wide range of moisture content. The rooting depth of most crops is limited by droughtiness in the substratum.

Most areas are used as cropland. Some are used as pasture or woodland. Some have been planted to pine. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. In most years crop yields are limited by the low available water capacity. If cultivated crops are grown, soil blowing is a hazard. It can be controlled by conservation tillage, field windbreaks, and winter cover crops. Returning crop residue to the soil or adding other organic material reduces the amount of water lost through evaporation, helps to maintain fertility, increases the rate of water infiltration, and reduces the susceptibility to soil blowing.

A cover of pasture plants is effective in controlling soil blowing. Overgrazing can cause surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, measures that improve fertility, and pasture rotation help to keep the pasture in good condition.

This soil is suited to trees. Seedling mortality is a management concern. Seedling survival can be improved by careful planting of vigorous nursery stock. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

This soil is suited to dwellings and to local roads and streets. It readily absorbs the effluent in septic tank absorption fields. It does not adequately filter the effluent, however, because of the rapid permeability. The poor filtering capacity can result in the pollution of ground water.

The land capability classification is IIIs. The woodland ordination symbol is 6S.

CkB—Chetek sandy loam, 2 to 6 percent slopes. This deep, gently sloping, somewhat excessively drained soil is in slightly convex areas on outwash plains and stream terraces. Individual areas are irregular in shape and generally range from 10 to 80 acres in size.

Typically, the surface layer is very dark grayish brown sandy loam about 8 inches thick. The subsurface layer is brown sandy loam about 5 inches thick. The subsoil is about 7 inches thick. It is dark brown, friable sandy loam in the upper part and dark brown, very friable gravelly loamy sand in the lower part. The substratum to a depth of about 60 inches is strong brown, stratified sand and gravel. In places the lower part of the subsoil is sandy loam. In some areas the depth to sand and gravel is more than 20 inches. In other areas the slope is less than 2 or more than 6 percent.

Included with this soil in mapping are small areas of the excessively drained Menahga soils. These soils are sandy throughout. They are in the slightly higher positions on the landscape. They make up 2 to 10 percent of the unit.

Permeability is moderately rapid in the subsoil of the Chetek soil and rapid or very rapid in the substratum. The available water capacity is low. The organic matter content is moderately low or moderate in the surface layer. This layer is friable and can be easily tilled throughout a wide range of moisture content. The rooting depth of most crops is limited by droughtiness in the sandy part of the subsoil and in the substratum.

Most areas are used as cropland. Some are used as pasture or woodland. Some have been planted to pine. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. In most years crop yields are limited by the low available water capacity. If cultivated crops are grown, erosion is a slight or moderate hazard. Also, the soil is subject to soil blowing. Most areas have slopes that are too short and too irregular to be stripcropped or cultivated on the contour. Conservation tillage, field windbreaks, and winter cover crops help to control erosion and soil blowing. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazards of erosion and soil blowing.

A cover of pasture plants is effective in controlling erosion and soil blowing. Overgrazing can cause surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, pasture rotation, measures that improve fertility, and timely deferment of grazing help to keep the pasture in good condition.

This soil is suited to trees. Seedling mortality is a management concern. Seedling survival can be improved by careful planting of vigorous nursery stock. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

This soil is suited to dwellings and to local roads and streets. It readily absorbs the effluent in septic tank absorption fields. It does not adequately filter the effluent, however, because of the rapid permeability. The poor filtering capacity can result in the pollution of ground water.

The land capability classification is IIIe. The woodland ordination symbol is 6S.

CkC2—Chetek sandy loam, 6 to 12 percent slopes, eroded. This deep, sloping, somewhat excessively drained soil is on side slopes and knolls on outwash plains, stream terraces, and pitted moraines. Individual areas are irregular in shape and generally range from 5 to 25 acres in size.

In most cultivated areas on the crest of hills and the upper side slopes, erosion has removed most of the original surface layer. Typically, the remaining surface layer is very dark grayish brown sandy loam about 7 inches thick. The subsoil is dark brown, friable sandy loam about 12 inches thick. The substratum to a depth of about 60 inches is brown, stratified sand and gravel. In places it has a few cobbles. In some areas the slope is less than 6 or more than 12 percent.

Included with this soil in mapping are a few small areas of the excessively drained Mahtomedi soils. These soils are in positions on the landscape similar to those of the Chetek soil. They are loamy sand in the surface layer and in the upper part of the subsoil. Also included, on knolls and sharp slope breaks, are a few areas of soils that have a surface layer of gravelly loamy sand. Included soils make up 5 to 15 percent of the unit.

Permeability is moderately rapid in the subsoil of the Chetek soil and rapid or very rapid in the substratum. The available water capacity is low. The organic matter content is moderately low or moderate in the surface layer. This layer is friable and can be easily tilled throughout a wide range of moisture content. The rooting depth of most crops is limited by droughtiness in the substratum.

Most areas are used as cropland or pasture. A few are wooded. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. In most years crop yields are limited by the low available water capacity. If cultivated crops are grown, water erosion is a moderate hazard. Also, the soil is subject to soil blowing. Most areas have slopes that are too short and too irregular to be stripcropped or cultivated on the contour. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazards of erosion and soil blowing.

A cover of pasture plants is effective in controlling erosion and soil blowing. Overgrazing can cause surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, pasture rotation, measures that improve fertility, and timely deferment of grazing help to keep the pasture in good condition.

This soil is suited to trees. Seedling mortality is a management concern. Seedling survival can be improved by careful planting of vigorous nursery stock. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

This soil readily absorbs the effluent in septic tank absorption fields. It does not adequately filter the effluent, however, because of the rapid permeability. The poor filtering capacity can result in the pollution of ground water.

Because of the slope, this soil is only moderately suited to dwellings. This limitation can be overcome by cutting and filling, by installing retaining walls, or by designing the dwellings so that one side of the basement fronts on the lower part of the slope. Also, the dwellings can be constructed in the included areas where the slope is less than 6 percent.

Because of the slope, this soil is only moderately suited to local roads and streets. This limitation can be overcome by shaping the roadway through cutting and filling. Also, the road can be built in the less sloping areas.

The land capability classification is IVe. The woodland ordination symbol is 6S.

CkD2—Chetek-Mahtomedi complex, 12 to 25 percent slopes, eroded. These deep, moderately steep and steep soils are on side slopes on outwash plains and pitted moraines. The Chetek soil is somewhat excessively drained, and the Mahtomedi soil is excessively drained. Individual areas are irregular in shape and generally range from 10 to 80 acres in size. They are 45 to 55 percent Chetek soil and 25 to 35 percent Mahtomedi soil. The two soils occur as areas so intricately mixed or so small that separating them in mapping is not practical.

In most cultivated areas on the crest of hills and the upper side slopes, erosion has removed most of the original surface layer of both soils. Typically, the remaining surface layer in the Chetek soil is dark brown sandy loam about 5 inches thick. The subsoil is about 10 inches thick. It is reddish brown, friable sandy loam in the upper part and dark brown, very friable gravelly loamy sand in the lower part. The substratum to a depth of about 60 inches is strong brown and yellowish brown, stratified sand and gravel.

Typically, the remaining surface layer in the Mahtomedi soil is dark brown loamy sand about 6 inches thick. The subsoil is reddish brown, very friable gravelly loamy sand about 15 inches thick. The substratum to a depth of about 60 inches is yellowish red sand and gravel. In places the slope is less than 12 or more than 25 percent.

Included with these soils in mapping are small areas of the well drained Rosholt soils. These included soils are in positions on the landscape similar to those of the Chetek and Mahtomedi soils. They have a loamy solum and are deeper to sand and gravel than the Chetek and Mahtomedi soils. They make up 10 to 25 percent of the unit.

Permeability is moderately rapid in the subsoil of the Chetek soil and rapid or very rapid in the substratum. The available water capacity is low. The organic matter content is moderately low or moderate in the surface layer. This layer is friable and can be easily tilled throughout a wide range of moisture content. The rooting depth of most crops is limited by droughtiness in the sandy part of the subsoil and in the substratum.

Permeability is rapid in the Mahtomedi soil. The available water capacity is low. Natural fertility also is low. The organic matter content is very low or low in the surface layer. The rooting depth of most crops is limited by droughtiness in the sandy subsoil and in the substratum.

Most areas are used as pasture. A few are used as cropland or woodland. A few have been planted to pine. Because of severe or very severe hazards of erosion, drought, and soil blowing, these soils generally are not suited to cultivated crops. They are poorly suited to pasture. A cover of pasture plants is effective in controlling erosion and soil blowing, but forage yields generally are low because of the low available water capacity. Overgrazing can cause surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, measures that improve fertility, and pasture rotation help to keep the pasture in good condition.

These soils are suited to trees. The erosion hazard, the equipment limitation, and seedling mortality are management concerns. Planting on the contour and carefully locating skid roads during harvest minimize erosion. Seedling survival on the steeper slopes facing south or west can be improved by careful planting of vigorous nursery stock. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

Because of the slope and a poor filtering capacity, these soils are poorly suited to septic tank absorption fields. The slope can be overcome by cutting and filling or by installing a trench absorption system on the contour. Also, the absorption field can be installed in the included areas where the slope is less than 12 percent. The soils readily absorb the effluent from septic tanks. They do not adequately filter the effluent, however, because of the rapid or very rapid permeability. The poor filtering capacity can result in the pollution of ground water.

Because of the slope, these soils are poorly suited to dwellings. This limitation can be overcome by cutting and filling, by installing retaining walls, or by designing the dwelling so that one side of the basement fronts on the lower part of the slope. Also, the dwelling can be built in the included areas where the slope is less than 12 percent.

Because of the slope, these soils are poorly suited to local roads and streets. This limitation can be overcome by shaping the roadway through cutting and filling. Also, the road can be built in the less sloping areas.

The land capability classification is VIe. The woodland ordination symbol is 6R.

CkE—Chetek-Mahtomedi complex, 25 to 40 percent slopes. These deep, steep and very steep soils are on terrace escarpments. The Chetek soil is somewhat excessively drained, and the Mahtomedi soil is excessively drained. Individual areas are long and narrow and generally range from 10 to 200 acres in size. They are 40 to 50 percent Chetek soil and 30 to 40 percent Mahtomedi soil. The two soils occur as areas so intricately mixed or so small that separating them in mapping is not practical.

Typically, the Chetek soil has a surface layer of very dark grayish brown sandy loam about 3 inches thick. The subsurface layer is brown sandy loam about 2 inches thick. The subsoil is about 14 inches thick. It is dark brown. It is friable sandy loam in the upper part and very friable gravelly loamy sand in the lower part. The substratum to a depth of about 60 inches is stratified sand and gravel.

Typically, the Mahtomedi soil has a surface layer of very dark grayish brown loamy sand about 4 inches thick. The subsurface layer is brown sand about 2 inches thick. The subsoil is about 15 inches thick. It is loose. It is dark brown coarse sand in the upper part and reddish brown coarse sand and gravel in the lower part. The substratum to a depth of about 60 inches is dark brown coarse sand and gravel. In places the slope is less than 25 percent.

Included with these soils in mapping are small areas of the excessively drained Menahga soils. These included soils are in positions on the landscape similar to those of the Chetek and Mahtomedi soils. They are sandy throughout. They make up 10 to 25 percent of the unit.

Permeability is moderately rapid in the subsoil of the Chetek soil and rapid or very rapid in the substratum. The available water capacity is low. The organic matter content is moderately low or moderate in the surface layer.

Permeability is rapid in the Mahtomedi soil. The available water capacity is low. Natural fertility also is low. The organic matter content is very low or low in the surface layer.

These soils are not suited to cultivated crops or pasture because of very severe hazards of erosion, drought, and soil blowing.

Most areas are wooded. These soils are suited to trees. The erosion hazard, the equipment limitation, and seedling mortality are management concerns. Planting on the contour and carefully locating skid roads during harvest minimize erosion. Seedling survival on the steeper slopes facing south or west can be improved by careful planting of vigorous nursery stock. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

These soils generally are not suitable as sites for septic tank absorption fields, dwellings, or local roads and streets, mainly because of the slope. Overcoming this limitation is difficult. A better suited site should be considered.

The land capability classification is VIIe. The woodland ordination symbol is 6R.

Cm—Comstock silt loam, 0 to 2 percent slopes. This deep, nearly level, somewhat poorly drained soil is on slightly concave foot slopes and along drainageways on glacial lake plains. Individual areas are irregular in shape and generally range from 10 to 120 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 8 inches thick. The subsurface layer is grayish brown, mottled silt loam about 4 inches thick. The subsoil is mostly brown, dark yellowish brown, and yellowish brown, mottled, firm silt loam about 36 inches thick. The substratum to a depth of about 60 inches is yellowish brown, mottled silt loam. In places the slope is more than 2 percent.

Included with this soil in mapping are small areas of the somewhat poorly drained Almena, poorly drained and very poorly drained Barronett, and moderately well drained Crystal Lake soils. Almena soils are in positions on the landscape similar to those of the Comstock soil. They are underlain by gravelly sandy loam till. Barronett soils are in the lower positions on the landscape. Crystal Lake soils are in the slightly higher positions. Included soils make up 5 to 15 percent of the unit.

Permeability is moderate in the subsoil of the Comstock soil and moderately slow in the substratum. The available water capacity is very high. The organic matter content is moderate in the surface layer. This layer is friable and can be easily tilled, but it tends to crust and puddle after hard rains or if it is tilled when too wet. The rooting depth of most crops is limited by a seasonal high water table, which is at a depth of 1 to 3 feet in undrained areas.

Most areas are used as cropland. If drained, this soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Land smoothing, surface drains, diversions, interceptor subsurface drains, and grassed waterways help to remove excess water. If tile drains are installed, silt and the finer sand enter the tile lines unless a suitable filter is used to cover the tile. Applying a system of conservation tillage and returning crop residue to the soil or adding other organic material help to maintain fertility and good tilth and increase the rate of water infiltration.

This soil is suited to pasture. The surface layer is subject to crusting, which restricts the emergence of small-seeded crops. Alfalfa is generally short lived because of the seasonal high water table and the winterkill caused by frost heave. Red clover is generally grown. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, pasture rotation, measures that improve fertility, and timely deferment of grazing help to keep the pasture in good condition.

This soil is suited to trees. The equipment limitation and the windthrow hazard are management concerns. Because of the wetness, hand planting or machine planting on prepared ridges generally is needed if natural regeneration is unreliable. Selection of vigorous nursery stock for planting reduces the seedling mortality rate. Harvesting is frequently limited to periods when the ground is frozen. Harvesting by clearcut or area-selection methods helps to prevent windthrow of the remaining trees. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

Because of the wetness and the moderately slow permeability in the substratum, this soil is poorly suited to septic tank absorption fields. Mounding the site with suitable filtering material helps to overcome these limitations. Also, the effluent can be pumped to an absorption field on a better suited soil in some nearby areas.

Because of the wetness, this soil is poorly suited to dwellings. This limitation can be overcome by constructing the foundation on coarse textured fill material above the level of wetness and by installing tile drains around the foundations and providing gravity outlets or other dependable outlets.

Because of low strength and the potential for frost action, this soil is poorly suited to local roads and streets. These limitations can be overcome by replacing the upper part of the soil with coarse textured base material, such as sand or gravel. Low strength also can be overcome by increasing the thickness of the pavement or base material.

The land capability classification is IIw. The woodland ordination symbol is 3W.

CuA—Crystal Lake silt loam, 0 to 3 percent slopes. This deep, nearly level and gently sloping, moderately well drained soil is in plane and slightly convex areas on glacial lake plains. Individual areas are irregular in shape and generally range from 20 to 120 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 8 inches thick. The subsurface layer is mostly grayish brown silt loam about 16 inches thick. The subsoil is dark brown, mottled, friable silt loam about 20 inches thick. The substratum to a depth of about 60 inches is brown, mottled silt loam. In places the slope is more than 3 percent.

Included with this soil in mapping are small areas of the well drained Campia and somewhat poorly drained Comstock soils. Campia soils are in the higher positions on the landscape. Comstock soils are in the lower positions. Included soils make up 5 to 10 percent of the unit.

Permeability is moderate in the subsoil of the Crystal Lake soil and moderately slow in the substratum. The available water capacity is very high. The organic matter content is moderate in the surface layer. This layer is friable but tends to crust and puddle after hard rains or if it is tilled when too wet. The depth to the seasonal high water table ranges from 2.5 to 6.0 feet.

Most areas are used as cropland. A few are used as pasture or woodland. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Applying a system of conservation tillage, returning crop residue to the soil, and adding other organic material help to maintain fertility and good tilth and increase the rate of water infiltration.

This soil is suited to pasture. The surface layer is subject to crusting, which restricts the emergence of the plants. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, pasture rotation, measures that improve fertility, and restricted use during wet periods help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

Because of the wetness and the moderately slow permeability in the substratum, this soil is poorly suited to septic tank absorption fields. Mounding the site with suitable filtering material helps to overcome these limitations. Also, the effluent can be pumped to an absorption field on a better suited soil in some nearby areas.

Because of the shrink-swell potential, this soil is only moderately suited to dwellings without basements. This limitation can be overcome by excavating the soil and replacing it with coarse textured material, such as sand or gravel; by strengthening the basement walls; and by installing a subsurface drainage system at or below the basement elevation. The wetness is a limitation on sites for dwellings with basements. It can be overcome by constructing foundations on coarse textured fill material above the level of wetness and by installing tile drains around the foundations and providing gravity outlets or other dependable outlets.

Because of low strength and the potential for frost action, this soil is poorly suited to local roads and streets. Low strength can be overcome by replacing the upper part of the soil with coarse textured base material, such as sand or gravel, and by increasing the thickness of the pavement or base material. Installing a subsurface drainage system and replacing the upper part of the soil with coarse textured base material help to prevent the damage caused by frost action.

The land capability classification is I. The woodland ordination symbol is 3A.

EIB—Eleva sandy loam, 2 to 6 percent slopes. This moderately deep, gently sloping, well drained and somewhat excessively drained soil is on slightly convex foot slopes and on the tops of ridges in the uplands. Individual areas are irregular in shape and generally range from 5 to 50 acres in size.

Typically, the surface layer is very dark grayish brown sandy loam about 8 inches thick. The subsurface layer is dark yellowish brown sandy loam about 5 inches thick. The subsoil is yellowish brown and dark brown, friable sandy loam about 23 inches thick. The substratum is pale brown sand about 3 inches thick. Poorly cemented sandstone is at a depth of about 39 inches. In places the slope is more than 6 percent.

Included with this soil in mapping are small areas of the well drained Billett and Elkmound soils. Billett soils are underlain by sand. They are in the slightly lower positions on the landscape. Elkmound soils are shallow over sandstone. They are in the higher positions on the landscape. Included soils make up 2 to 10 percent of the unit.

Permeability is moderate or moderately rapid in the subsoil of the Eleva soil and moderately rapid or rapid in the substratum. The available water capacity is low. The organic matter content is moderately low or moderate in the surface layer. This layer is friable and can be easily tilled throughout a wide range of moisture content. The rooting depth of most crops is limited by the droughtiness in the sandy substratum or by the underlying sandstone.

Most areas are used as cropland or pasture. A few are wooded. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. In most years crop yields are limited by the low available water capacity. If cultivated crops are grown, water erosion is a slight or moderate hazard. Also, soil blowing is a hazard. Contour farming, contour stripcropping, grassed waterways, field windbreaks, and conservation tillage help to control erosion and soil blowing. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazards of erosion and soil blowing.

A cover of pasture plants is effective in controlling erosion and soil blowing. Overgrazing can cause surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, pasture rotation, measures that improve fertility, and timely deferment of grazing help to keep the pasture in good condition.

This soil is poorly suited to trees. The trees grow so slowly and are so poorly shaped that they seldom attain more than minimum merchantability. The soil-related management problems are minor.

Because of the depth to bedrock and the rapid permeability in the substratum, this soil is poorly suited to septic tank absorption fields. The poor filtering capacity can result in the pollution of ground water. The absorption field functions adequately if the site is mounded with suitable filtering material.

This soil is suited to dwellings without basements, but it is only moderately suited to dwellings with basements because of the depth to bedrock. This limitation can be overcome by ripping and excavating the bedrock with suitable power equipment; by adding fill material, which raises the site; or by constructing the dwellings with only partially exposed basements.

Because of the potential for frost action, this soil is only moderately suited to local roads and streets. Replacing the upper part of the soil with coarse textured base material, such as sand or gravel, helps to prevent the damage caused by frost action.

The land capability classification is IIIs. The woodland ordination symbol is 2A.

EIC2—Eleva sandy loam, 6 to 12 percent slopes, eroded. This moderately deep, sloping, well drained and somewhat excessively drained soil is on side slopes in the uplands. Individual areas are irregular in shape and generally range from 5 to 80 acres in size.

In most cultivated areas on the crest of hills and the upper side slopes, erosion has removed most of the original surface layer. Typically, the remaining surface layer is very dark grayish brown sandy loam about 9 inches thick. The subsoil is about 27 inches thick. It is friable. It is dark yellowish brown loam in the upper part and yellowish brown sandy loam in the lower part. The substratum is yellowish brown sand about 4 inches thick. Poorly cemented sandstone is at a depth of about 40 inches. In places the slope is less than 6 or more than 12 percent.

Included with this soil in mapping are small areas of the well drained Elkmound and excessively drained Plainbo soils. Elkmound soils are shallow over sandstone. They are in the higher positions on the landscape. Plainbo soils formed in sandy deposits over sandstone. They are in the lower positions on the landscape. Included soils make up 5 to 15 percent of the unit.

Permeability is moderate or moderately rapid in the subsoil of the Eleva soil and moderately rapid or rapid in the substratum. The available water capacity is low. The organic matter content is moderately low or moderate in the surface layer. This layer is friable and can be easily tilled throughout a wide range of moisture content. The rooting depth of most crops is limited by droughtiness in the sandy substratum or by the underlying sandstone.

Most areas are used as cropland or pasture. A few are wooded. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. In most years crop yields are limited by the low available water capacity. If cultivated crops are grown, water erosion is a moderate hazard. Also, soil blowing is a hazard. Contour farming, contour stripcropping, and conservation tillage help to control erosion and soil blowing. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazards of erosion and soil blowing.

A cover of pasture plants is effective in controlling erosion and soil blowing. Overgrazing can cause surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, pasture rotation, measures that improve fertility, and timely deferment of grazing help to keep the pasture in good condition.

This soil is poorly suited to trees. The trees grow so slowly and are so poorly shaped that they seldom attain more than minimum merchantability. The soil-related management problems are minor.

Because of the depth to bedrock and the rapid permeability in the substratum, this soil is poorly suited to septic tank absorption fields. It readily absorbs but does not adequately filter the effluent. The poor filtering capacity can result in the pollution of ground water. The absorption field functions adequately if the site is mounded with suitable filtering material.

Because of the slope, this soil is only moderately suited to dwellings. This limitation can be overcome by cutting and filling, by installing retaining walls, or by designing the dwelling so that one side of the basement fronts on the lower part of the slope. Also, the dwelling can be constructed in the included areas where the slope is less than 6 percent. The depth to bedrock is a limitation on sites for dwellings with basements. It can be overcome by ripping and excavating the bedrock with suitable power equipment; by adding fill material, which raises the site; or by constructing the dwellings with only partially exposed basements.

Because of the slope and the potential for frost action, this soil is only moderately suited to local roads and streets. The slope can be overcome by shaping the roadway through cutting and filling. Also, the road can be built in the less sloping areas. Replacing the upper part of the soil with coarse textured base material, such as sand or gravel, helps to prevent the damage caused by frost action.

The land capability classification is IIIe. The woodland ordination symbol is 2A.

EID2—Eleva sandy loam, 12 to 20 percent slopes, eroded. This moderately deep, moderately steep, well drained and somewhat excessively drained soil is on side slopes in the uplands. Individual areas are irregular in shape and generally range from 5 to 60 acres in size.

In most cultivated areas on the crest of hills and the upper side slopes, erosion has removed most of the original surface layer. Typically, the remaining surface layer is dark brown sandy loam about 5 inches thick. The subsoil is about 19 inches thick. It is dark brown. It is friable sandy loam in the upper part and very friable loamy sand in the lower part. The substratum is yellowish brown sand about 14 inches thick. Poorly cemented sandstone is at a depth of about 38 inches. In places, the soil is severely eroded and the dark brown subsoil is exposed. In some areas the slope is less than 12 or more than 20 percent.

Included with this soil in mapping are small areas of the well drained Elkmound and excessively drained Plainbo soils. Elkmound soils are shallow over sandstone. They are in the higher positions on the landscape. Plainbo soils formed in sandy deposits over sandstone. They are in the lower positions on the landscape. Included soils make up 5 to 15 percent of the unit.

Permeability is moderate or moderately rapid in the subsoil of the Eleva soil and moderately rapid or rapid in the substratum. The available water capacity is low. The organic matter content is moderately low or moderate in the surface layer. This layer is friable and can be easily tilled throughout a wide range of moisture content. The rooting depth of most crops is limited by droughtiness in the sandy lower layers or by the underlying sandstone.

Most areas are used as cropland or pasture. A few are wooded. This soil is suited to corn and small grain and to grasses and legumes for hay and pasture. In most years crop yields are limited by the low available water capacity. If cultivated crops are grown, water erosion is a severe hazard. Also, soil blowing is a hazard. Contour farming, contour stripcropping, crop rotations that include grasses and legumes, and conservation tillage help to control erosion and soil blowing. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazards of erosion and soil blowing.

A cover of pasture plants is effective in controlling erosion and soil blowing. Overgrazing can cause surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, pasture rotation, measures that improve fertility, and timely deferment of grazing help to keep the pasture in good condition.

This soil is poorly suited to trees. The trees grow so slowly and are so poorly shaped that they seldom attain more than minimum merchantability. The erosion hazard and the equipment limitation are management concerns. Planting trees on the contour and carefully locating skid roads during harvest minimize erosion. Seedling survival on the steeper slopes facing south or west can be improved by careful planting of vigorous nursery stock.

Because of the depth to bedrock, the slope, and the rapid permeability in the substratum, this soil is poorly suited to septic tank absorption fields. It readily absorbs but does not adequately filter the effluent. The poor filtering capacity can result in the pollution of ground water. The depth to bedrock and the poor filtering capacity can be overcome by mounding the site with suitable filtering material. The slope can be overcome by cutting and filling or by installing a trench absorption system on the contour.

Because of the slope, this soil is poorly suited to dwellings. This limitation can be overcome by cutting and filling or by installing retaining walls. Also, the dwelling can be designed so that one side of the basement fronts on the lower part of the slope.

Because of the slope, this soil is poorly suited to local roads and streets. This limitation can be overcome by shaping the roadway through cutting and filling. Also, the road can be built in the less sloping areas.

The land capability classification is IVe. The woodland ordination symbol is 2R.

EmB—Elkmound loam, 2 to 6 percent slopes. This shallow, gently sloping, well drained soil is on foot slopes and the tops of ridges in the uplands. Individual areas are irregular in shape and generally range from 5 to 30 acres in size.

Typically, the surface layer is dark brown loam about 8 inches thick. The subsoil is about 11 inches thick. It is friable. It is dark brown fine sandy loam in the upper part and dark yellowish brown sandy loam in the lower part. Poorly cemented sandstone is at a depth of about 19 inches. In places the surface layer is sandy loam.

Included with this soil in mapping are small areas of the well drained and somewhat excessively drained Eleva soils. These soils are in positions on the landscape similar to those of the Elkmound soil. They are deeper to sandstone than the Elkmound soil. They make up 5 to 15 percent of the unit.

Permeability is moderate or moderately rapid in the Elkmound soil. The available water capacity is low. The organic matter content is moderately low in the surface layer. This layer is friable and can be easily tilled throughout a wide range of moisture content. The rooting depth of most crops is limited by the underlying sandstone.

Most areas are used as cropland. A few are wooded. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. In most years crop yields are limited by the low available water capacity. If cultivated crops are grown, water erosion is a slight or moderate hazard. It can be controlled by contour farming, contour stripcropping, grassed waterways, field windbreaks, and conservation tillage. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazard of erosion.

A cover of pasture plants is effective in controlling erosion. Overgrazing can cause surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, pasture rotation, measures that improve fertility, and timely deferment of grazing help to keep the pasture in good condition.

This soil is poorly suited to trees. The trees grow slowly and are poorly shaped. Seedling mortality and windthrow are management concerns. Harvesting equipment can be used, but the soil is too shallow for machine planting. Selecting vigorous nursery stock for planting reduces the seedling mortality rate. Harvesting by clearcut or area-selection methods helps to prevent windthrow of the remaining trees.

Because of the shallow depth to bedrock, this soil generally is not suited to septic tank absorption fields, is only moderately suited to dwellings without basements, and is poorly suited to dwellings with basements. On sites for dwellings, this limitation can be overcome by ripping and excavating the bedrock with suitable power equipment; by adding fill material, which raises the site; or by constructing the dwellings with only partially exposed basements.

Because of the depth to bedrock and the potential for frost action, this soil is only moderately suited to local roads and streets. The bedrock can be removed by blasting or by using suitable power equipment. The potential for frost action can be overcome by replacing the upper part of the soil with coarse textured base material, such as sand or gravel.

The land capability classification is IIIe. The woodland ordination symbol is 2D.

EmC2—Elkmound loam, 6 to 12 percent slopes, eroded. This shallow, sloping, well drained soil is on side slopes in the uplands. Individual areas are irregular in shape and generally range from 5 to 100 acres in size.

In most cultivated areas on the crest of hills and the upper side slopes, erosion has removed most of the original surface layer. Typically, the remaining surface layer is dark brown loam about 8 inches thick. The subsoil is yellowish brown, friable sandy loam about 9 inches thick. Partially weathered, platy sandstone is at a depth of about 17 inches. In places the surface layer is sandy loam. In some areas the slope is less than 6 or more than 12 percent.

Included with this soil in mapping are small areas of the well drained and somewhat excessively drained Eleva and excessively drained Plainbo soils. Eleva soils are in positions on the landscape similar to those of the Elkmound soil. They are deeper to sandstone than the Elkmound soil. Plainbo soils formed in sandy deposits over sandstone. They are in the lower positions on the landscape. Included soils make up 5 to 15 percent of the unit.

Permeability is moderate or moderately rapid in the Elkmound soil. The available water capacity is low. The organic matter content is moderately low in the surface layer. This layer is friable and can be easily tilled throughout a wide range of moisture content. The rooting depth of most crops is limited by the underlying sandstone.

Most areas are used as cropland. A few are wooded. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. In most years crop yields are limited by the low available water capacity. If cultivated crops are grown, water erosion is a moderate hazard. It can be controlled by contour farming, contour stripcropping, and conservation tillage. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazard of erosion.

A cover of pasture plants is effective in controlling erosion. Overgrazing can cause surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, pasture rotation, measures that improve fertility, and timely deferment of grazing help to keep the pasture in good condition.

This soil is poorly suited to trees. The trees grow slowly and are poorly shaped. Seedling mortality and windthrow are management concerns. Selection of vigorous nursery stock for planting reduces the seedling mortality rate. Harvesting by clearcut or area-selection methods helps to prevent windthrow of the remaining trees.

Because of the shallow depth to bedrock, this soil generally is not suited to septic tank absorption fields and is poorly suited to dwellings with basements. Because of the slope and the depth to bedrock, it is only moderately suited to dwellings without basements. On sites for dwellings, the slope can be overcome by cutting and filling or by installing retaining walls. Also, the dwellings can be constructed in the included areas where the slope is less than 6 percent. The depth to bedrock can be overcome by excavating the bedrock with suitable power equipment; by adding fill material, which raises the site; or by constructing the dwellings with partially exposed basements.

Because of the depth to bedrock, the slope, and the potential for frost action, this soil is only moderately suited to local roads and streets. The bedrock can be removed by blasting or by using suitable power equipment. The slope can be overcome by shaping the roadway through cutting and filling. Also, the road can be built in the less sloping areas. Replacing the upper part of the soil with coarse textured base material, such as sand or gravel, helps to prevent the damage caused by frost action.

The land capability classification is IVe. The woodland ordination symbol is 2D.

EmD2—Elkmound loam, 12 to 20 percent slopes, eroded. This shallow, moderately steep, well drained soil is on side slopes in the uplands. Individual areas are irregular in shape and generally range from 5 to 150 acres in size.

In most cultivated areas on the crest of hills and the upper side slopes, erosion has removed most of the original surface layer. Typically, the remaining surface layer is dark brown loam about 7 inches thick. The subsoil is about 12 inches thick. It is yellowish brown and dark yellowish brown, friable sandy loam in the upper part and yellowish brown, very friable loamy fine sand in the lower part. Partially weathered, platy sandstone is at a depth of about 19 inches. In places the surface layer is sandy loam. In some areas the slope is less than 12 or more than 20 percent.

Included with this soil in mapping are small areas of the excessively drained Boone and well drained and somewhat excessively drained Eleva soils. Boone soils formed in sandy deposits over sandstone. They are in the lower positions on the landscape. Eleva soils are in positions similar to those of the Elkmound soil. They are deeper to sandstone than the Elkmound soil. Included soils make up 5 to 15 percent of the unit.

Permeability is moderate or moderately rapid in the Elkmound soil. The available water capacity is low. The organic matter content is moderately low in the surface layer. The rooting depth of most crops is limited by droughtiness in the sandy part of the subsoil or by the underlying sandstone.

Most areas are used as pasture or woodland. This soil is generally not suited to cultivated crops because of a severe hazard of water erosion. A cover of pasture plants is effective in controlling erosion. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, pasture rotation, measures that improve fertility, and timely deferment of grazing help to keep the pasture in good condition.

This soil is poorly suited to trees. The trees grow slowly and are poorly shaped. The erosion hazard, the equipment limitation, seedling mortality, and the windthrow hazard are management concerns. The use of equipment is limited by shallow depth to bedrock and the slope. Hand planting, contour planting, and careful selection of sites for access roads help to offset trafficability problems and help to control erosion. Selection of vigorous nursery stock for planting reduces the seedling mortality rate. Harvesting by clearcut or area-selection methods helps to prevent windthrow of the remaining trees.

Because of the shallow depth to bedrock and the slope, this soil generally is not suited to septic tank absorption fields. Because of the slope, it is poorly suited to dwellings. On sites for dwellings, the slope can be overcome by cutting and filling, by installing retaining walls, or by designing the dwelling so that one side of the basement fronts on the lower part of the slope. Also, the dwelling can be constructed in the included areas where the slope is less than 6 percent. The depth to bedrock is a limitation on sites for dwellings with basements. It can be overcome by ripping and excavating the bedrock with suitable power equipment; by adding fill material, which raises the site; or by constructing the dwellings with only partially exposed basements.

Because of the slope, this soil is poorly suited to local roads and streets. This limitation can be overcome by shaping the roadway through cutting and filling. Also, the road can be built in the less sloping areas.

The land capability classification is VIe. The woodland ordination symbol is 2R.

EmE—Elkmound loam, 20 to 45 percent slopes. This shallow, steep and very steep, well drained soil is on side slopes in the uplands. Individual areas are irregular in shape and generally range from 5 to 100 acres in size.

Typically, the surface layer is black loam about 2 inches thick. The subsurface layer is brown loam about 4 inches thick. The subsoil is about 10 inches thick. It is dark yellowish brown and friable. It is loam in the upper part and sandy loam in the lower part. Partially weathered, platy sandstone is at a depth of about 16 inches. In places the surface layer is sandy loam. In some areas the slope is less than 20 percent.

Included with this soil in mapping are small areas of the excessively drained Boone and well drained and somewhat excessively drained Eleva soils. Boone soils formed in sandy deposits over sandstone. They are in the lower positions on the landscape. Eleva soils are in positions similar to those of the Elkmound soil. They are deeper to sandstone than the Elkmound soil. Included soils make up 5 to 15 percent of the unit.

Permeability is moderate or moderately rapid in the Elkmound soil. The available water capacity is low. The organic matter content is moderately low in the surface layer. The rooting depth of most plants is limited by the underlying sandstone.

Most areas are wooded. Because of a severe or very severe hazard of water erosion, this soil is not suited to cultivated crops. It is poorly suited to pasture because of the hazard of erosion and the difficulty in operating machinery on these steep and very steep slopes. In some of the less sloping areas, the pasture can be renovated and improved. The native vegetation generally is of poor quality for forage.

This soil is poorly suited to trees. The trees grow slowly and are poorly shaped. The erosion hazard, the equipment limitation, seedling mortality, and windthrow are management concerns. The use of equipment is limited by the shallow depth to bedrock and the slope. Hand planting, contour planting, and careful selection of sites for access roads help to offset trafficability problems and help to control erosion. Selection of vigorous nursery stock for planting reduces the seedling mortality rate. Harvesting by clearcut or area-selection methods helps to prevent windthrow of the remaining trees.

This soil generally is not suitable as a site for septic tank absorption fields, dwellings, or local roads and streets, mainly because of the depth to bedrock and the slope. Overcoming these limitations is difficult. A better suited site should be considered.

The land capability classification is VIIe. The woodland ordination symbol is 2R.

Eo—Elm Lake loamy sand, 0 to 2 percent slopes. This moderately deep or deep, nearly level, poorly drained soil is in drainageways and depressions on uplands. It is subject to ponding. Individual areas are elongated and generally range from 5 to 150 acres in size.

Typically, the surface layer is black loamy sand about 4 inches thick. The substratum is about 44 inches thick. It is grayish brown, light brownish gray, and pale brown loamy sand and sand in the upper part and gray and olive gray, mottled silty clay loam in the lower part. Poorly cemented sandstone interbedded with shale is at a depth of about 48 inches. In places the surface layer is mucky loamy sand or sandy loam.

Included with this soil in mapping are small areas of the somewhat poorly drained Merrillan and poorly drained and very poorly drained Newson soils. Merrillan soils have a loamy surface soil and subsoil. They are in the slightly higher positions on the landscape. Newson soils are sandy throughout. They are in positions on the landscape similar to those of the Elm Lake soil. Included soils make up 5 to 15 percent of the unit.

Permeability is rapid in the sandy mantle of the Elm Lake soil and very slow in the underlying silty or loamy residuum. The available water capacity is low. The organic matter content is moderately low in the surface layer. The rooting depth of most plants is limited by a seasonal high water table, which is near or above the surface in undrained areas.

Most areas of this soil are used as unimproved pasture or as woodland. Some are used as wetland wildlife habitat. Undrained areas generally are not suited to cultivated crops because of the wetness and the frost hazard. Drained areas are suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. The number of frost-free days per growing season is limited. Planting early maturing corn varieties or growing the corn for silage helps to overcome the frost hazard.

Unless drained, this soil is poorly suited to pasture. Establishing an improved pasture is difficult because of the wetness. Grazing is limited to the short periods when the soil is dry. The native vegetation generally is of poor quality for forage.

This soil is poorly suited to trees. The trees grow so slowly and are so poorly shaped that they are barely merchantable at best. The equipment limitation, seedling mortality, and the windthrow hazard are management concerns. Because of the wetness, hand planting or machine planting on prepared ridges generally is needed if natural regeneration is unreliable. Selection of vigorous nursery stock for planting reduces the seedling mortality rate. Harvesting is frequently limited to periods when the ground is frozen. Harvesting by clearcut or area-selection methods helps to prevent windthrow of the remaining trees. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

This soil generally is not suitable as a site for septic tank absorption fields, dwellings, or local roads and streets, mainly because of the depth to bedrock and the ponding. Overcoming these limitations is difficult. A better suited site should be considered.

The land capability classification is VIw in undrained areas. The woodland ordination symbol is 3W.

FaB—Fallcreek sandy loam, 2 to 6 percent slopes. This deep, gently sloping, somewhat poorly drained soil is on slightly convex side slopes and knolls on ground moraines. Individual areas are irregularly shaped or elongated and generally range from 10 to 30 acres in size.

Typically, the surface layer is very dark grayish brown sandy loam about 8 inches thick. The subsurface layer is mostly brown, mottled sandy loam about 12 inches thick. The subsoil is mostly reddish brown, mottled, firm loam about 20 inches thick. The substratum to a depth of about 60 inches is reddish brown loam. In places cobbles and stones cover as much as 20 percent of the surface.

Included with this soil in mapping are small areas of the moderately well drained Flambeau and poorly drained and very poorly drained Cable soils. Flambeau soils are in the slightly higher positions on the landscape. Cable soils have a silty surface layer and subsoil. They are in the lower positions on the landscape. Included soils make up 2 to 10 percent of the unit.

Permeability is moderately slow in the Fallcreek soil. The available water capacity is high. The organic matter content is moderately low or moderate in the surface layer. This layer is friable and can be easily tilled throughout a wide range of moisture content. The rooting depth of most crops is limited by a seasonal high water table, which is at a depth of 1 to 3 feet in undrained areas.

Most areas are used as cropland. If drained, this soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, water erosion is a slight or moderate hazard. Also, the soil is subject to soil blowing. Terraces, contour farming, contour stripcropping, grassed waterways, and diversions help to remove excess water and help to control erosion and soil blowing. Applying a system of conservation tillage and returning crop residue to the soil or adding other organic material help to maintain fertility and good tilth and increase the rate of water infiltration.

A cover of pasture plants is effective in controlling erosion and soil blowing. Alfalfa is generally short lived unless the soil is adequately drained. Overgrazing or grazing when the soil is wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, measures that improve fertility, pasture rotation, and timely deferment of grazing help to keep the pasture in good condition.

This soil is suited to trees. The equipment limitation and the windthrow hazard are management concerns. Because of the wetness, hand planting or machine planting on prepared ridges generally is needed if natural regeneration is unreliable. Selection of vigorous nursery stock for planting reduces the seedling mortality rate. Harvesting is frequently limited to periods when the ground is frozen. Harvesting by clearcut or area-selection methods helps to prevent windthrow of the remaining trees. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

Because of the wetness and the moderately slow permeability, this soil is poorly suited to septic tank absorption fields. Mounding the site with suitable filtering material helps to overcome these limitations. Also, the effluent can be pumped to an absorption field on a better suited soil in some nearby areas.

Because of the wetness, this soil is poorly suited to dwellings. This limitation can be overcome by constructing foundations on coarse textured fill material above the level of wetness and by installing tile drains around the foundations and providing gravity outlets or other dependable outlets.

Because of the potential for frost action, this soil is poorly suited to local roads and streets. Replacing the upper part of the soil with coarse textured base material, such as sand or gravel, helps to prevent the damage caused by frost action.

The land capability classification is IIe. The woodland ordination symbol is 4W.

FbB—Flambeau loam, 2 to 6 percent slopes. This deep, gently sloping, moderately well drained soil is on side slopes and knolls on ground moraines. Individual areas are irregular in shape and generally range from 5 to 75 acres in size.

Typically, the surface layer is very dark grayish brown loam about 8 inches thick. The subsurface layer is about 9 inches of brown loam and brown, mottled sandy loam. The subsoil is about 19 inches thick. It is reddish brown, mottled, and firm. It is loam in the upper part and sandy clay loam in the lower part. The substratum to a depth of about 60 inches is reddish brown loam. In some places the surface layer is sandy loam. In other places about 25 percent of the surface is covered with cobbles. In some areas the slope is more than 6 percent.

Included with this soil in mapping are small areas of the somewhat poorly drained Fallcreek and Withee soils. Fallcreek soils have a sandy loam surface layer. They are in the lower positions on the landscape. Withee soils formed in silty deposits and in loam till. They are in the slightly lower positions on the landscape. Included soils make up 2 to 5 percent of the unit.

Permeability is moderate in the subsoil of the Flambeau soil and moderately slow in the substratum. The available water capacity is high. The organic matter content is moderate in the surface layer. This layer is friable and can be easily tilled, but it tends to crust and puddle after hard rains or if it is tilled when too wet. The depth to the seasonal high water table ranges from 2.5 to 3.5 feet.

Most areas are used as cropland. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, water erosion is a slight or moderate hazard. It can be controlled by contour farming, contour stripcropping, conservation tillage, and grassed waterways. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazard of erosion.

A cover of pasture plants is effective in controlling erosion. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, pasture rotation, measures that improve fertility, and timely deferment of grazing help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

Because of the wetness and the moderately slow permeability in the substratum, this soil is poorly suited to septic tank absorption fields. Mounding the site with suitable filtering material helps to overcome these limitations. Also, the effluent can be pumped to an absorption field on a better suited soil in some nearby areas.

This soil is suited to dwellings without basements, but it is only moderately suited to dwellings with basements because of the wetness. This limitation can be overcome by installing tile drains around foundations and providing gravity outlets or other dependable outlets and by constructing the foundations on coarse textured fill material above the level of wetness.

Because of low strength and the potential for frost action, this soil is only moderately suited to local roads and streets. Low strength can be overcome by replacing the upper part of the soil with coarse base material, such as sand or gravel, and by increasing the thickness of the pavement or the base or subbase material. Installing a subsurface drainage system and replacing the upper part of the soil with coarse textured base material help to prevent the damage caused by frost action.

The land capability classification is IIe. The woodland ordination symbol is 4A.

FbC2—Flambeau loam, 6 to 12 percent slopes, eroded. This deep, sloping, moderately well drained soil is on knolls and side slopes adjacent to drainageways on ground moraines. Individual areas are irregular in shape and generally range from 5 to 50 acres in size.

In most cultivated areas on the crest of hills and the upper side slopes, erosion has removed most of the original surface layer. Typically, the remaining surface layer is grayish brown loam about 8 inches thick. The subsurface layer is brown loam about 7 inches thick. The subsoil is reddish brown, mottled, firm loam about 17 inches thick. The substratum to a depth of about 60 inches is reddish brown loam. In a few places the surface layer is sandy loam. In some areas about 20 percent of the surface is covered with cobbles. In other areas the slope is less than 6 or more than 12 percent.

Included with this soil in mapping are small areas of the well drained Arland soils. These soils are in positions on the landscape similar to those of the Flambeau soil. They are underlain by sandstone. They make up 5 to 10 percent of the unit.

Permeability is moderate in the subsoil of the Flambeau soil and moderately slow in the substratum. The available water capacity is high. The organic matter content is moderate in the surface layer. This layer is friable and can be easily tilled, but it tends to crust and puddle after hard rains or if it is tilled when too wet. The depth to the seasonal high water table ranges from 2.5 to 3.5 feet.

Most areas are used as cropland. A few are used as pasture or woodland. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, water erosion is a moderate hazard. It can be controlled by contour farming, contour stripcropping, conservation tillage, diversions, and grassed waterways. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazard of erosion.

A cover of pasture plants is effective in controlling erosion. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, pasture rotation, measures that improve fertility, and timely deferment of grazing help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

Because of the wetness and the moderately slow permeability in the substratum, this soil is poorly suited to septic tank absorption fields. Mounding the site with suitable filtering material helps to overcome these limitations. Also, the effluent can be pumped to an absorption field on a better suited soil in some nearby areas.

Because of the slope, this soil is only moderately suited to dwellings. This limitation can be overcome by cutting and filling, by installing retaining walls, or by designing the dwellings so that one side of the basement fronts on the lower part of the slope. Also, the dwellings can be constructed in the included areas where the slope is less than 6 percent. Wetness is a limitation on sites for dwellings with basements. This limitation can be overcome by installing tile drains around foundations and providing gravity outlets or other dependable outlets and by constructing the foundations on coarse textured fill material above the level of wetness.

Because of low strength, the slope, and the potential for frost action, this soil is only moderately suited to local roads and streets. Low strength and frost action can be overcome by replacing the upper part of the soil with coarse textured base material, such as sand or gravel. Low strength also can be overcome by increasing the thickness of the pavement or base material. The slope can be overcome by shaping the roadway through cutting and filling. Also, the road can be built in the less sloping areas.

The land capability classification is IIIe. The woodland ordination symbol is 4A.

Fm—Fordum loam, 0 to 2 percent slopes. This deep, nearly level, poorly drained and very poorly drained soil is in plane or slightly concave areas on flood plains. It is subject to ponding and is frequently flooded for long periods. Individual areas are long and narrow and generally range from 10 to 100 acres in size.

Typically, the surface layer is very dark grayish brown, mottled loam about 9 inches thick. The upper 12 inches of the substratum is grayish brown, mottled sandy loam. The next 11 inches is brown, mottled loamy sand. The lower part to a depth of about 60 inches is pale brown sand. In places the surface layer is silt loam. In some areas layers of organic material are in the substratum.

Included with this soil in mapping are small areas of the very poorly drained Markey and poorly drained and very poorly drained Newson soils. Markey soils formed in organic material in depressions. Newson soils are in positions on the landscape similar to those of the Fordum soil. They are sandy throughout. Also included are areas of Rib mucky silt loam, ponded, 0 to 2 percent slopes. This soil is in positions on the landscape similar to those of the Fordum soil. It formed in silty deposits over stratified sand and gravel. Included soils make up 5 to 10 percent of the unit.

Permeability is moderate or moderately rapid in the loamy mantle of the Fordum soil and rapid or very rapid in the sandy substratum. The available water capacity is moderate. The organic matter content is high or very high in the surface layer. The rooting depth of most plants is limited by a seasonal high water table, which is near or above the surface in undrained areas.

Most areas support wetland vegetation. Because of the wetness, a scarcity of suitable drainage outlets, and the flooding, this soil generally is not suited to cultivated crops. It is poorly suited to pasture unless it is drained and protected from flooding. Establishing or maintaining improved pasture is difficult because of the wetness. Grazing is limited to the short periods when the soil is dry. The native vegetation is generally of poor quality for forage.

This soil is suited to trees. The equipment limitation, seedling mortality, and the windthrow hazard are management concerns. Because of the wetness, hand planting or machine planting on prepared ridges generally is needed if natural regeneration is unreliable. Selection of vigorous nursery stock for planting reduces the seedling mortality rate. Harvesting is frequently limited to periods when the ground is frozen. Harvesting by clearcut or area-selection methods helps to prevent windthrow of the remaining trees. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

This soil generally is not suitable as a site for septic tank absorption fields, dwellings, or local roads and streets, mainly because of the flooding and the ponding. Overcoming these hazards is difficult. A better suited site should be considered.

The land capability classification is VIw. The woodland ordination symbol is 2W.

FnB—Freeon silt loam, 2 to 6 percent slopes. This deep, gently sloping, moderately well drained soil is on side slopes and knolls on ground moraines. Individual areas are irregular in shape and generally range from 5 to 60 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 8 inches thick. The subsurface layer is mostly brown, mottled silt loam about 11 inches thick. The subsoil is about 19 inches thick. It is mottled and firm. The upper part is dark brown silt loam, the next part is reddish brown loam, and the lower part is reddish brown sandy loam. The substratum to a depth of about 60 inches is reddish brown sandy loam. In some places the surface layer is loam or sandy loam. In other places cobbles are on the surface. In some areas the slope is less than 2 or more than 6 percent.

Included with this soil in mapping are small areas of the somewhat poorly drained Magnor and well drained Santiago soils. Magnor soils are in the slightly lower positions in the landscape. Santiago soils are in the slightly higher positions. Included soils make up 5 to 15 percent of the unit.

Permeability is moderately slow or moderate in the subsoil of the Freeon soil and moderately slow in the substratum. The available water capacity is high. The organic matter content is moderately low or moderate in the surface layer. This layer is friable and can be easily tilled, but it tends to crust or puddle after hard rains or if it is tilled when too wet. The depth to the seasonal high water table ranges from 2 to 3 feet.

Most areas are used as cropland. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, water erosion is a slight or moderate hazard. It can be controlled by contour farming, contour stripcropping, conservation tillage, diversions, and grassed waterways. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazard of erosion.

A cover of pasture plants is effective in controlling erosion. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, pasture rotation, measures that improve fertility, and timely deferment of grazing help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

Because of the wetness and the moderately slow permeability in the substratum, this soil is poorly suited to septic tank absorption fields. Mounding the site with suitable filtering material helps to overcome these limitations. Also, the effluent can be pumped to an absorption field on a better suited soil in some nearby areas.

Because of the wetness, this soil is only moderately suited to dwellings without basements and is poorly suited to dwellings with basements. This limitation can be overcome by constructing foundations on coarse textured fill material above the level of wetness and by installing tile drains around the foundations and providing gravity outlets or other dependable outlets.

Because of the wetness and the potential for frost action, this soil is only moderately suited to local roads and streets. Installing a subsurface drainage system and replacing the upper part of the soil with coarse textured base material, such as sand or gravel, help to prevent the damage caused by wetness and frost action.

The land capability classification is IIe. The woodland ordination symbol is 4A.

FnC2—Freeon silt loam, 6 to 12 percent slopes, eroded. This deep, sloping, moderately well drained soil is on side slopes and knolls on ground moraines and end moraines. Individual areas are irregular in shape and generally range from 5 to 30 acres in size.

In most cultivated areas on the crest of hills and the upper side slopes, erosion has removed most of the original surface layer. Typically, the remaining surface layer is dark grayish brown silt loam about 7 inches thick. The subsurface layer is mostly brown, mottled silt loam about 11 inches thick. The subsoil is about 20 inches thick. It is mottled. The upper part is brown, friable silt loam; the next part is reddish brown, firm loam; and the lower part is reddish brown, firm sandy loam. The substratum to a depth of about 60 inches is reddish brown sandy loam. In places the surface layer is loam or sandy loam. In some areas cobbles are on the surface.

Included with this soil in mapping are small areas of the well drained Amery and Santiago soils. Amery soils formed in loamy deposits. Both of the included soils are in the higher positions on the landscape. They make up 10 to 15 percent of the unit.

Permeability is moderately slow or moderate in the subsoil of the Freeon soil and moderately slow in the substratum. The available water capacity is high. The organic matter content is moderately low or moderate in the surface layer. This layer is friable and can easily tilled, but it tends to crust and puddle after hard rains or if it is tilled when too wet. The depth to the seasonal high water table ranges from 2 to 3 feet.

Most areas are used as cropland. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, water erosion is a moderate hazard. It can be controlled by contour farming, contour stripcropping, conservation tillage, diversions, and grassed waterways. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazard of erosion.

A cover of pasture plants is effective in controlling erosion. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, pasture rotation, measures that improve fertility, and timely deferment of grazing help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

Because of the wetness and the moderately slow permeability in the substratum, this soil is poorly suited to septic tank absorption fields. Mounding the site with suitable filtering material helps to overcome these limitations. Also, the effluent can be pumped to an absorption field on a better suited soil in some nearby areas.

Because of the wetness and the slope, this soil is only moderately suited to dwellings without basements. Because of the wetness, it is poorly suited to dwellings with basements. The wetness can be overcome by installing tile drains around foundations and providing gravity outlets or other dependable outlets and by constructing the foundations on coarse textured fill material above the level of wetness. The slope can be overcome by cutting and filling or by installing retaining walls.

Because of the wetness, the slope, and the potential for frost action, this soil is only moderately suited to local roads and streets. The slope can be overcome by shaping the roadway through cutting and filling. Also, the road can be built in the less sloping areas. Installing a subsurface drainage system and replacing the upper part of the soil with coarse textured base material, such as sand or gravel, help to prevent the damage caused by wetness and frost action.

The land capability classification is IIIe. The woodland ordination symbol is 4A.

FrA—Friendship loamy sand, 0 to 3 percent slopes. This deep, nearly level and gently sloping, moderately well drained soil is in plane areas on outwash plains and stream terraces. Individual areas are irregular in shape and generally range from 5 to 80 acres in size.

Typically, the surface layer is very dark grayish brown loamy sand about 8 inches thick. The subsoil is sand about 28 inches thick. It is dark brown and very friable in the upper part and is brown, mottled, and loose in the lower part. The substratum to a depth of about 60 inches is strong brown and light yellowish brown, mottled sand. In places the surface layer is sand, loamy fine sand, or fine sandy loam. In some areas loamy strata are in the subsoil and substratum.

Included with this soil in mapping are small areas of the somewhat poorly drained Meehan, excessively drained Menahga, and moderately well drained Moundville soils. Meehan soils are in the slightly lower positions on the landscape. Menahga soils are in positions similar to those of the Friendship soil or are in the slightly higher positions. Moundville soils are in positions similar to those of the Friendship soil. They have slightly more clay in the upper part of the subsoil than the Friendship soil. Included soils make up 5 to 10 percent of the unit.

Permeability is rapid in the Friendship soil. The available water capacity is low. Natural fertility also is low. The organic matter content is low or moderately low in the surface layer. This layer is very friable and can be easily tilled throughout a wide range of moisture content. The rooting depth of most crops is limited by droughtiness in the sandy subsoil and substratum unless water is available from the seasonal high water table. The depth to the seasonal high water table ranges from 2.5 to 6.0 feet.

Most areas are used as cropland. Some have been planted to pine. A few support native trees. This soil is poorly suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If irrigated, however, it is suited to the commonly grown farm crops and to vegetables, such as snap beans, potatoes, sweet corn, and peas. In most years crop yields are limited by the low available water capacity. If cultivated crops are grown, the soil is subject to soil blowing. Winter cover crops, conservation tillage, wind stripcropping, and field windbreaks help to prevent excessive soil loss. Returning crop residue to the soil or adding other organic material reduces the amount of water lost through evaporation, increases the rate of water infiltration, helps to maintain fertility, and reduces the susceptibility to soil blowing.

A cover of pasture plants is effective in controlling soil blowing. Forage yields are generally low unless fertilizer is applied and the soil receives an adequate amount of moisture. Planting early in spring, before the soil has a chance to dry out, helps to overcome the droughtiness. Planting later in the year is likely to result in a poor survival rate. Overgrazing can cause surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Measures that improve fertility, proper stocking rates, and pasture rotation help to keep the pasture in good condition.

This soil is suited to trees. Seedling mortality is a management concern. Seedling survival can be improved by careful planting of vigorous nursery stock. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

This soil readily absorbs the effluent in septic tank absorption fields. It does not adequately filter the effluent, however, because of the rapid permeability. The poor filtering capacity can result in the pollution of ground water. The wetness also is a limitation. Mounding the site with suitable filtering material helps to overcome the wetness and the poor filtering capacity. Also, the effluent can be pumped to an absorption field on a better suited soil in some nearby areas.

This soil is suited to local roads and streets and to dwellings without basements. Because of the wetness, however, it is only moderately suited to dwellings with basements. This limitation can be overcome by installing tile drains around foundations and providing gravity outlets or other dependable outlets and by constructing the foundations on coarse textured fill material above the level of wetness.

The land capability classification is IVs. The woodland ordination symbol is 6S.

GaB—Gale silt loam, 2 to 6 percent slopes. This moderately deep, gently sloping, well drained soil is on side slopes and ridgetops in the uplands. Individual areas are irregular in shape and generally range from 5 to 50 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 10 inches thick. The subsurface layer is brown silt loam about 3 inches thick. The subsoil is about 21 inches thick. It is friable. It is dark yellowish brown and dark brown silt loam in the upper part and dark yellowish brown loam in the lower part. The substratum is strong brown sand about 10 inches thick. Platy sandstone is at a depth of about 44 inches. In places the surface layer is loam. In some areas the slope is more than 6 percent.

Included with this soil in mapping are small areas of the moderately well drained Hiles and well drained Northfield and Seaton soils. Hiles soils are underlain by sandstone and shale. They are in the lower positions on the landscape. Northfield and Seaton soils are in positions similar to those of the Gale soil. Northfield soils are shallow over sandstone. Seaton soils are underlain by silt loam or sand. Included soils make up 2 to 5 percent of the unit.

Permeability is moderate in the upper part of the Gale soil and rapid in the sandy residuum. The available water capacity is moderate. The organic matter content is moderately low or moderate in the surface layer. This layer is friable and can be easily tilled, but it tends to crust and puddle after hard rains or if it is tilled when too wet. The rooting depth of most crops is limited by droughtiness in the sandy substratum or by the underlying sandstone.

Most areas are used as cropland. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, water erosion is a slight or moderate hazard. It can be controlled by contour farming, contour stripcropping, grassed waterways, and conservation tillage. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazard of erosion.

A cover of pasture plants is effective in controlling erosion. The surface layer is subject to crusting, which restricts the emergence of the plants. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, measures that improve fertility, and restricted use during wet periods help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

Because of the depth to bedrock and the rapid permeability in the substratum, this soil is poorly suited to septic tank absorption fields. It readily absorbs but does not adequately filter the effluent. The poor filtering capacity can result in the pollution of ground water. The absorption field functions adequately if the site is mounded with suitable filtering material.

Because of the shrink-swell potential, this soil is only moderately suited to dwellings. This limitation can be overcome by excavating the soil and replacing it with coarse textured material, such as sand or gravel; by strengthening the basement walls; and by installing a subsurface drainage system at or below the basement elevation. The depth to bedrock is a limitation on sites for dwellings with basements. It can be overcome by ripping and excavating the bedrock with suitable power equipment; by adding fill material, which raises the site; or by constructing the dwellings with only partially exposed basements.

Because of low strength and the potential for frost action, this soil is poorly suited to local roads and streets. Low strength can be overcome by replacing the upper part of the soil with coarse textured base material, such as sand or gravel, and by increasing the thickness of the pavement or the base or subbase material. Installing a subsurface drainage system and replacing the upper part of the soil with coarse textured base material help to prevent the damage caused by frost action.

The land capability classification is IIe. The woodland ordination symbol is 5A.

GaC2—Gale silt loam, 6 to 12 percent slopes, eroded. This moderately deep, sloping, well drained soil is on side slopes and ridgetops in the uplands. Individual areas are irregular in shape and generally range from 5 to 100 acres in size.

In most cultivated areas on the crest of hills and the upper side slopes, erosion has removed most of the original surface layer. Typically, the remaining surface layer is very dark grayish brown silt loam about 8 inches thick. The subsurface layer is brown silt loam about 4 inches thick. The subsoil is about 24 inches thick. It is friable. It is dark brown and dark yellowish brown silt loam in the upper part and yellowish brown loamy fine sand in the lower part. Sandstone is at a depth of about 36 inches. In places the surface layer is loam. In some areas the slope is less than 6 or more than 12 percent.

Included with this soil in mapping are small areas of the well drained Northfield and Seaton soils. Northfield soils are shallow over sandstone. They are in the slightly higher positions on the landscape. Seaton soils are in positions similar to those of the Gale soil. They are underlain by silt loam or sand. Included soils make up 5 to 10 percent of the unit.

Permeability is moderate in the upper part of the Gale soil and rapid in the sandy residuum. The available water capacity is moderate. The organic matter content is moderately low or moderate in the surface layer. This layer is friable and can be easily tilled, but it tends to crust and puddle after hard rains or if it is tilled when too wet. The rooting depth of most crops is limited by droughtiness in the sandy residuum or by the underlying sandstone.

Most areas are used as cropland or pasture. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, erosion is a moderate hazard. It can be controlled by contour farming, contour stripcropping, grassed waterways, and conservation tillage. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazard of erosion.

A cover of pasture plants is effective in controlling erosion. The surface layer is subject to crusting, which restricts the emergence of the plants. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, measures that improve fertility, and restricted use during wet periods help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

Because of the depth to bedrock and the rapid permeability in the substratum, this soil is poorly suited to septic tank absorption fields. It readily absorbs but does not adequately filter the effluent. The poor filtering capacity can result in the pollution of ground water. The absorption field functions adequately if the site is mounded with suitable filtering material.

Because of the shrink-swell potential and the slope, this soil is only moderately suited to dwellings. The shrink-swell potential can be overcome by excavating the soil and replacing it with coarse textured material, such as sand or gravel, under and around the foundation. The slope can be overcome by cutting and filling, by installing retaining walls, or by designing the dwellings so that one side of the basement fronts on the lower part of the slope. Also, the dwellings can be constructed in the included areas where the slope is less than 6 percent. The depth to bedrock is a limitation on sites for dwellings with basements. It can be overcome by ripping and excavating the bedrock with suitable power equipment; by adding fill material, which raises the site; or by constructing the dwellings with only partially exposed basements.

Because of low strength and the potential for frost action, this soil is poorly suited to local roads and streets. These limitations can be overcome by replacing the upper part of the soil with coarse textured base material, such as sand or gravel. Low strength also can be overcome by increasing the thickness of the pavement or the base material.

The land capability classification is IIIe. The woodland ordination symbol is 5A.

GaD2—Gale silt loam, 12 to 20 percent slopes, eroded. This moderately deep, moderately steep, well drained soil is on side slopes in the uplands. Individual areas are irregular in shape and generally range from 5 to 80 acres in size.

In most cultivated areas on the crest of hills and the upper side slopes, erosion has removed most of the original surface layer. Typically, the remaining surface layer is dark brown silt loam about 6 inches thick. The subsoil is about 24 inches thick. It is friable. It is dark yellowish brown and dark brown silt loam in the upper part and dark yellowish brown, friable loam in the lower part. The substratum is strong brown sand about 4 inches thick. Sandstone bedrock is at a depth of about 34 inches. In places the surface layer is loam. In some areas the slope is less than 12 or more than 20 percent.

Included with this soil in mapping are small areas of the well drained Northfield and Seaton soils. Northfield soils are shallow over sandstone. They are in the slightly higher positions on the landscape. Seaton soils are in positions similar to those of the Gale soil. They are underlain by silt loam. Included soils make up 5 to 15 percent of the unit.

Permeability is moderate in the upper part of the Gale soil and rapid in the sandy residuum. The available water capacity is moderate. The organic matter content is moderately low or moderate in the surface layer. This layer is friable and can be easily tilled, but it tends to crust and puddle after hard rains or if it is tilled when too wet. The rooting depth of most crops is limited by droughtiness in the sandy substratum or by the underlying sandstone.

Most areas are used as cropland or pasture. This soil is suited to corn and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, erosion is a severe hazard. It can be controlled by contour farming, contour stripcropping, and conservation tillage. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazard of erosion.

A cover of pasture plants is effective in controlling erosion. The surface layer is subject to crusting, which restricts the emergence of the plants. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, measures that improve fertility, and restricted use during wet periods help to keep the pasture in good condition.

This soil is suited to trees. The erosion hazard and the equipment limitation are management concerns. Planting on the contour and carefully locating skid roads during harvest minimize erosion. Seedling survival on the steeper slopes facing south or west can be improved by careful planting of vigorous nursery stock. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

Because of the depth to bedrock, the slope, and the rapid permeability in the substratum, this soil is poorly suited to septic tank absorption fields. It readily absorbs but does not adequately filter the effluent. The poor filtering capacity can result in the pollution of ground water. The depth to bedrock and the poor filtering capacity can be overcome by mounding the site with suitable filtering material. The slope can be overcome by cutting and filling or by installing a trench absorption system on the contour.

Because of the slope, this soil is poorly suited to dwellings. This limitation can be overcome by cutting and filling or by installing retaining walls. Also, the dwelling can be designed so that one side of the basement fronts on the lower part of the slope.

Because of the low strength, the slope, and the potential for frost action, this soil is poorly suited to local roads and streets. Low strength and frost action can be overcome by replacing the upper part of the soil with coarse textured base material, such as sand or gravel. Low strength also can be overcome by increasing the thickness of the pavement or the base material. The slope can be overcome by shaping the roadway through cutting and filling. Also, the road can be built in the less sloping areas.

The land capability classification is IVe. The woodland ordination symbol is 5R.

Gr—Greenwood peat, 0 to 1 percent slopes. This deep, nearly level, very poorly drained soil is in depressions on ground moraines and end moraines. It is subject to ponding. Individual areas are irregular in shape and generally range from 10 to 200 acres in size.

Typically, the organic material is at least 60 inches thick. The upper part is light gray sphagnum moss, the next part is dark brown and very dark grayish brown mucky peat, and the lower part is very dark brown muck.

Included with this soil in mapping are small areas of the very poorly drained Lupton soils. These soils are in positions on the landscape similar to those of the Greenwood soil. They typically are neutral in reaction. They make up 5 to 10 percent of the unit.

Permeability is moderately rapid in the Greenwood soil. The available water capacity is very high. The organic matter content also is very high. The rooting depth of most plants is limited by a seasonal high water table, which is near or above the surface in undrained areas.

Most areas support wetland vegetation. Because of the wetness, a scarcity of suitable drainage outlets, the hazard of frost late in spring and early in fall, and an extremely acid reaction, this soil is generally not suited to cultivated crops or to pasture. If drained and cultivated, it is subject to burning and subsidence. It also is subject to soil blowing.

This soil is poorly suited to trees. The trees grow so poorly and are so poorly shaped that they are barely merchantable at best. The equipment limitation, seedling mortality, and the windthrow hazard are management concerns. Harvesting is frequently limited to periods when the ground is frozen. Harvesting by clearcut or area-selection methods helps to prevent windthrow of the remaining trees. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation.

This soil generally is not suitable as a site for septic tank absorption fields, dwellings, or local roads and streets, mainly because of the ponding. Overcoming this hazard is difficult. A better suited site should be considered.

The land capability classification is VIIw in undrained areas. The woodland ordination symbol is 3W.

Ha—Halder loam, 0 to 2 percent slopes. This deep, nearly level, somewhat poorly drained soil is in slightly concave areas on stream terraces and outwash plains. Individual areas are elongated and generally range from 5 to 30 acres in size.

Typically, the surface layer is very dark grayish brown loam about 8 inches thick. The subsurface layer is grayish brown, mottled loam about 4 inches thick. The subsoil is about 20 inches thick. It is mostly dark brown, mottled, friable loam in the upper part and dark brown, mottled, friable gravelly sandy loam in the lower part. The substratum to a depth of about 60 inches is yellowish brown and brown, stratified sand and gravel. In places the surface layer is sandy loam or silt loam. In some areas the slope is more than 2 percent.

Included with this soil in mapping are small areas of the moderately well drained Scott Lake soils. These soils are in the slightly higher positions on the landscape. They make up 5 to 10 percent of the unit.

Permeability is moderate in the upper part of the subsoil in the Halder soil and rapid or very rapid in the substratum. The available water capacity is moderate. The organic matter content is moderate in the surface layer. This layer is friable and can be easily tilled, but it tends to crust and puddle after hard rains or if it is tilled when too wet. The rooting depth of most crops is limited by a seasonal high water table, which is at a depth of 1.0 to 2.5 feet in undrained areas.

Most areas are used as cropland. A few are wooded. If drained, this soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Applying a system of conservation tillage and returning crop residue to the soil or adding other organic material help to maintain fertility and good tilth and increase the rate of water infiltration. Land smoothing, a surface drainage system, diversions, and interceptor subsurface drains help to remove excess water. If tile drains are installed, the finer sand enters the tile lines unless a suitable filter covers the tile.

This soil is suited to pasture. Alfalfa is generally short lived unless the soil is adequately drained. Overgrazing or grazing when the soil is wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, measures that improve fertility, pasture rotation, and timely deferment of grazing help to keep the pasture in good condition.

This soil is suited to trees. The equipment limitation and the windthrow hazard are management concerns. Because of the wetness, hand planting or machine planting on prepared ridges generally is needed if natural regeneration is unreliable. Selection of vigorous nursery stock for planting reduces the seedling mortality rate. Harvesting is frequently limited to periods when the ground is frozen. Harvesting by clearcut or area-selection methods helps to prevent windthrow of the remaining trees. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

This soil readily absorbs the effluent in septic tank absorption fields. It does not adequately filter the effluent, however, because of the rapid permeability. The poor filtering capacity can result in the pollution of ground water. The wetness also is a limitation. Mounding the site with suitable filtering material helps to overcome the wetness and the poor filtering capacity. Also, the effluent can be pumped to an absorption field on a better suited soil in some nearby areas.

Because of the wetness, this soil is poorly suited to dwellings. This limitation can be overcome by installing tile drains around foundations and providing gravity outlets or other dependable outlets and by constructing the foundations on coarse textured fill material above the level of wetness.

Because of the potential for frost action, this soil is poorly suited to local roads and streets. Replacing the upper part of the soil with coarse textured base material, such as sand or gravel, helps to prevent the damage caused by frost action.

The land capability classification is IIw. The woodland ordination symbol is 4W.

HeB—Hiles silt loam, 2 to 6 percent slopes. This moderately deep or deep, gently sloping, moderately well drained soil is on side slopes in the uplands. Individual areas are irregular in shape and generally range from 5 to 60 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 8 inches thick. The subsurface layer is brown silt loam about 3 inches thick. The subsoil is about 19 inches thick. The upper part is mostly yellowish brown, friable silt loam; the next part is olive, mottled, firm silty clay loam; and the lower part is light olive gray, mottled, friable loam. Weathered sandstone that has strata of shale is at a depth of about 30 inches. In places the surface layer is loam.

Included with this soil in mapping are small areas of the moderately well drained Hiles Variant, moderately well drained Humbird, and somewhat poorly drained Kert soils. Hiles Variant and Humbird soils are in positions on the landscape similar to those of the Hiles soil. Hiles Variant soils typically have a clayey subsoil. Humbird soils are sandy loam in the surface layer and in the upper part of the subsoil. Kert soils are in the lower positions on the landscape. Included soils make up 5 to 10 percent of the unit.

Permeability is moderate in the Hiles soil. The available water capacity is high. The organic matter content is moderately low or moderate in the surface layer. This layer is very friable and can be easily tilled, but it tends to crust and puddle after hard rains or if it is tilled when too wet. The rooting depth of most crops is limited by extreme acidity in the lower part of the subsoil or by the underlying sandstone and shale. The depth to the seasonal high water table ranges from 2 to 4 feet.

Most areas are used as cropland. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, water erosion is a slight or moderate hazard. It can be controlled by contour farming, contour stripcropping, conservation tillage, and grassed waterways. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazard of erosion.

A cover of pasture plants is effective in controlling erosion. The surface layer is subject to crusting, which restricts the emergence of the plants. Alfalfa is generally short lived unless the soil is adequately drained. Overgrazing or grazing when the soil is wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, measures that improve fertility, pasture rotation, and timely deferment of grazing help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

Because of the depth to bedrock and the wetness, this soil is poorly suited to septic tank absorption fields. Mounding the site with suitable filtering material helps to overcome these limitations. Also, the effluent can be pumped to an absorption field on a better suited soil in some nearby areas.

Because of the wetness, this soil is only moderately suited to dwellings without basements and is poorly suited to dwellings with basements. This limitation can be overcome by constructing foundations on coarse textured fill material above the level of wetness and by installing tile drains around the foundations and providing gravity outlets or other dependable outlets.

Because of the potential for frost action, this soil is only moderately suited to local roads and streets. Replacing the upper part of the soil with coarse textured base material, such as sand or gravel, helps to prevent the damage caused by frost action.

The land capability classification is IIe. The woodland ordination symbol is 4A.

HfB—Hiles Variant loam, 2 to 8 percent slopes. This deep, gently sloping and sloping, moderately well drained soil is on side slopes and ridgetops in the uplands. Individual areas are irregular in shape and generally range from 5 to 15 acres in size.

Typically, the surface layer is dark grayish brown loam about 8 inches thick. The subsurface layer is mostly brown loam about 6 inches thick. The subsoil is dusky red, mottled, firm clay about 26 inches thick. The substratum is pale olive and pale yellow loam about 8 inches thick. Sandstone and shale are at a depth of about 48 inches. In places the surface layer is silt loam. In some areas the slope is more than 8 percent.

Included with this soil in mapping are small areas of the moderately well drained Hiles and somewhat poorly drained Kert soils. These soils have a silty and loamy subsoil. Hiles soils are in the slightly higher positions on the landscape. Kert soils are in the lower positions. Included soils make up 1 to 5 percent of the unit.

Permeability is very slow in the subsoil of the Hiles Variant soil and moderate in the substratum. The available water capacity is moderate. The organic matter content is moderate in the surface layer. This layer is friable and can be easily tilled, but it tends to crust and puddle after hard rains or if it is tilled when too wet. The rooting depth of most crops is limited by the extreme acidity and clayey nature of the subsoil and by the underlying sandstone and shale. The depth to the seasonal high water table ranges from 2.5 to 3.5 feet.

Most areas are used as cropland. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, water erosion is a slight or moderate hazard. It can be controlled by contour farming, contour stripcropping, conservation tillage, diversions, and grassed waterways. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazard of erosion.

A cover of pasture plants is effective in controlling erosion. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, pasture rotation, measures that improve fertility, and timely deferment of grazing help to keep the pasture in good condition.

This soil is suited to trees. Seedling mortality and the windthrow hazard are management concerns. Selection of vigorous nursery stock for planting reduces the seedling mortality rate. Harvesting by clearcut or area-selection methods helps to prevent windthrow of the remaining trees. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

Because of the wetness and the slow permeability in the subsoil, this soil is poorly suited to septic tank absorption fields. Mounding the site with suitable filtering material helps to overcome these limitations. Also, the effluent can be pumped to an absorption field on a better suited soil in some nearby areas.

Because of the shrink-swell potential, this soil is poorly suited to dwellings. This limitation can be overcome by excavating the soil and replacing it with coarse textured material, such as sand or gravel, under and around the foundation; by strengthening basement walls; and by installing a subsurface drainage system at or below the basement elevation.

Because of the shrink-swell potential and low strength, this soil is poorly suited to local roads and streets. These limitations can be overcome by replacing the upper part of the soil with coarse textured base material, such as sand or gravel. Low strength also can be overcome by increasing the thickness of the pavement or base material.

The land capability classification is IIe. The woodland ordination symbol is 4C.

HnB—Hixton loam, 2 to 6 percent slopes. This moderately deep, gently sloping, well drained soil is on foot slopes and side slopes in the uplands. Individual areas are irregular in shape and generally range from 5 to 80 acres in size.

Typically, the surface layer is very dark grayish brown loam about 8 inches thick. The subsoil is about 18 inches thick. It is friable. It is dark brown and dark yellowish brown loam in the upper part and dark yellowish brown sandy loam in the lower part. The substratum is light yellowish brown sand about 12 inches thick. Poorly cemented sandstone is at a depth of about 38 inches.

Included with this soil in mapping are small areas of the well drained Northfield soils. These soils are in positions on the landscape similar to those of the Hixton soil. They are shallow over sandstone bedrock. Also included are a few small areas of soils that have a seasonal high water table at a depth of 3 to 5 feet. Included soils make up 5 to 10 percent of the unit.

Permeability is moderate in the subsoil of the Hixton soil and rapid in the substratum. The available water capacity is moderate. The organic matter content is moderately low in the surface layer. This layer is friable and can be easily tilled throughout a wide range of moisture content. The rooting depth of most crops is limited by droughtiness in the sandy substratum or by the underlying sandstone.

Most areas are used as cropland. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, water erosion is a slight or moderate hazard. It can be controlled by contour farming, contour stripcropping, conservation tillage, and grassed waterways. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazard of erosion.

A cover of pasture plants is effective in controlling erosion. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, pasture rotation, measures that improve fertility, and timely deferment of grazing help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

Because of the depth to bedrock and the rapid permeability in the substratum, this soil is poorly suited to septic tank absorption fields. The poor filtering capacity can result in the pollution of ground water. The absorption field functions adequately if the site is mounded with suitable filtering material.

This soil is suited to dwellings without basements, but it is only moderately suited to dwellings with basements because of the depth to bedrock. This limitation can be overcome by ripping and excavating the bedrock with suitable power equipment; by adding fill material, which raises the site; or by constructing the dwellings with only partially exposed basements.

Because of the potential for frost action, this soil is only moderately suited to local roads and streets. Replacing the upper part of the soil with coarse textured base material, such as sand or gravel, helps to prevent the damage caused by frost action.

The land capability classification is IIe. The woodland ordination symbol is 4A.

HnC2—Hixton loam, 6 to 12 percent slopes, eroded. This moderately deep, sloping, well drained soil is on side slopes in the uplands. Individual areas are irregular in shape and generally range from 5 to 60 acres in size.

In most cultivated areas on the crest of hills and the upper side slopes, erosion has removed most of the original surface layer. Typically, the remaining surface layer is very dark grayish brown loam about 7 inches thick. The subsurface layer is dark grayish brown loam about 4 inches thick. The subsoil is about 13 inches thick. It is friable. It is dark yellowish brown loam in the upper part and brown sandy loam in the lower part. The substratum is brown and strong brown loamy sand about 10 inches thick. Poorly cemented sandstone is at a depth of about 34 inches. In places the slope is less than 6 or more than 12 percent.

Included with this soil in mapping are small areas of the well drained and somewhat excessively drained Eleva and well drained Northfield soils. Eleva soils have less clay in the subsoil than the Hixton soil. Northfield soils are shallow over sandstone. Both of the included soils are in positions on the landscape similar to those of the Hixton soil. They make up 10 to 15 percent of the unit.

Permeability is moderate in the subsoil of the Hixton soil and rapid in the substratum. The available water capacity is moderate. The organic matter content is moderately low in the surface layer. This layer is friable and can be easily tilled throughout a wide range of moisture content. The rooting depth of most crops is limited by droughtiness in the sandy substratum or by the underlying sandstone.

Most areas are used as cropland or pasture. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, water erosion is a moderate hazard. It can be controlled by contour farming, contour stripcropping, conservation tillage, and grassed waterways. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazard of erosion.

A cover of pasture plants is effective in controlling erosion. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, pasture rotation, measures that improve fertility, and timely deferment of grazing help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

Because of the depth to bedrock and the rapid permeability in the substratum, this soil is poorly suited to septic tank absorption fields. The poor filtering capacity can result in the pollution of ground water. The absorption field functions adequately if the site is mounded with suitable filtering material.

Because of the slope, this soil is only moderately suited to dwellings. This limitation can be overcome by cutting and filling, by installing retaining walls, or by designing the dwellings so that one side of the basement fronts on the lower part of the slope. Also, the dwellings can be constructed in the included areas where the slope is less than 6 percent. The depth to bedrock is a limitation on sites for dwellings with basements. It can be overcome by ripping and excavating the bedrock with suitable power equipment; by adding fill material, which raises the site; or by constructing the dwellings with only partially exposed basements.

Because of the slope and the potential for frost action, this soil is only moderately suited to local roads and streets. The slope can be overcome by shaping the roadway through cutting and filling. Also, the road can be built in the less sloping areas. Replacing the upper part of the soil with coarse textured base material, such as sand or gravel, helps to prevent the damage caused by frost action.

The land capability classification is IIIe. The woodland ordination symbol is 4A.

HuB—Humbird sandy loam, 2 to 6 percent slopes. This moderately deep, gently sloping, moderately well drained soil is on side slopes and the tops of low ridges in the uplands. Individual areas are irregular in shape and generally range from 5 to 45 acres in size.

Typically, the surface layer is very dark grayish brown sandy loam about 8 inches thick. The subsoil is about 28 inches thick. In sequence downward, it is dark brown, friable sandy loam; brown, mottled, very friable loamy sand; yellowish brown, mottled, friable loam; and light olive gray, mottled, firm silty clay loam. Weathered sandstone interbedded with shale is at a depth of about 36 inches. In places the surface layer is loamy sand. In some areas the slope is more than 6 percent.

Included with this soil in mapping are small areas of the somewhat poorly drained Merrillan soils. These soils are in the lower positions on the landscape. They make up 2 to 10 percent of the unit.

Permeability is moderately rapid in the upper part of the subsoil in the Humbird soil and slow in the lower part. The available water capacity is low. The organic matter content is moderately low in the surface layer. This layer is very friable and can be easily tilled throughout a wide range of moisture content. The rooting depth of most crops is limited by the extreme acidity and massive nature of the lower part of the subsoil or by the underlying sandstone and shale. The depth to the seasonal high water table ranges from 2.5 to 6.0 feet.

Most areas are used as cropland. Some are wooded. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. In most years crop yields are limited by the low available water capacity. If cultivated crops are grown, water erosion is a slight or moderate hazard. Also, the soil is subject to soil blowing. Contour farming, contour stripcropping, conservation tillage, and grassed waterways help to control erosion and soil blowing. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazards of erosion and soil blowing.

A cover of pasture plants is effective in controlling erosion and soil blowing. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, pasture rotation, measures that improve fertility, and timely deferment of grazing help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

Because of the depth to bedrock, the wetness, and the slow permeability in the subsoil, this soil is poorly suited to septic tank absorption fields. Mounding the site with suitable filtering material helps to overcome these limitations. Also, the effluent can be pumped to an absorption field on a better suited soil in some nearby areas.

This soil is suited to dwellings without basements, but it is only moderately suited to dwellings with basements because of the wetness and the depth to bedrock. The wetness can be overcome by constructing foundations on coarse textured fill material above the level of wetness and by installing tile drains around the foundations and providing gravity outlets or other dependable outlets. The depth to bedrock can be overcome by ripping and excavating the bedrock with suitable power equipment; by adding fill material, which raises the site; or by constructing the dwellings with only partially exposed basements.

Because of the potential for frost action, this soil is only moderately suited to local roads and streets. Replacing the upper part of the soil with coarse textured base material, such as sand or gravel, helps to prevent the damage caused by frost action.

The land capability classification is IIIe. The woodland ordination symbol is 4A.

HuC2—Humbird sandy loam, 6 to 12 percent slopes, eroded. This moderately deep, sloping, moderately well drained soil is on side slopes and the tops of low ridges in the uplands. Individual areas are irregular in shape and generally are 3 to 10 acres in size.

In most cultivated areas on the crest of hills and the upper side slopes, erosion has removed most of the original surface layer. Typically, the remaining surface layer is very dark grayish brown sandy loam about 7 inches thick. The subsoil is about 24 inches thick. The upper part is dark brown, friable sandy loam; the next part is brown and dark brown, mottled, friable sandy loam; and the lower part is light brownish gray, firm silty clay. Weathered sandstone is at a depth of about 31 inches. In places the surface layer is loamy sand.

Included with this soil in mapping are small areas of the well drained Elkmound soils. These soils are shallow over sandstone. They are in the slightly higher positions on the landscape. They make up 5 to 10 percent of the unit.

Permeability is moderately rapid in the upper part of the subsoil in the Humbird soil and slow in the lower part. The available water capacity is low. The organic matter content is moderately low in the surface layer. This layer is very friable and can be easily tilled throughout a wide range of moisture content. The rooting depth of most crops is limited by the extreme acidity and massive nature of the lower part of the subsoil or by the underlying sandstone. The depth to the seasonal high water table ranges from 2.5 to 6.0 feet.

Most areas are used as cropland or pasture. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. In most years crop yields are limited by the low available water capacity. If cultivated crops are grown, water erosion is a moderate hazard. Also, the soil is subject to soil blowing. Contour farming, contour stripcropping, and conservation tillage help to control erosion and soil blowing. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazards of erosion and soil blowing.

A cover of pasture plants is effective in controlling erosion and soil blowing. Overgrazing can cause surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, pasture rotation, measures that improve fertility, and timely deferment of grazing help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

Because of the depth to bedrock, the wetness, and the slow permeability in the subsoil, this soil is poorly suited to septic tank absorption fields. Mounding the site with suitable filtering material helps to overcome these limitations. Also, the effluent can be pumped to an absorption field on a better suited soil in some nearby areas.

Because of the slope, this soil is only moderately suited to dwellings. This limitation can be overcome by cutting and filling, by installing retaining walls, or by designing the dwellings so that one side of the basement fronts on on the lower part of the slope. Also, the dwellings can be constructed in the included areas where the slope is less than 6 percent. The wetness and the depth to bedrock are limitations on sites for dwellings with basements. The wetness can be overcome by constructing foundations on coarse textured fill material above the level of wetness and by installing tile drains around the foundations and providing gravity outlets or other dependable outlets. The depth to bedrock can be overcome by ripping and excavating the bedrock with suitable power equipment; by adding fill material, which raises the site; or by constructing the dwellings with only partially exposed basements.

Because of the slope and the potential for frost action, this soil is only moderately suited to local roads and streets. The slope can be overcome by shaping the roadway through cutting and filling. Also, the road can be built in the less sloping areas. Replacing the upper part of the soil with coarse textured base material, such as sand or gravel, helps to prevent the damage caused by frost action.

The land capability classification is IVe. The woodland ordination symbol is 4A.

KeB—Kert silt loam, 1 to 6 percent slopes. This deep, nearly level and gently sloping, somewhat poorly drained soil is on foot slopes in the uplands. Individual areas are irregular in shape and generally range from 5 to 80 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 8 inches thick. The subsurface layer is mostly brown and grayish brown, mottled silt loam about 14 inches thick. The subsoil is about 18 inches thick. It is mottled and friable. It is pale olive loam in the upper part and dark brown sandy loam in the lower part. The upper part of the substratum is olive yellow and pale yellow, stratified sand and silt. The lower part to a depth of about 60 inches is reddish yellow loam. In places the surface layer is loam.

Included with this soil in mapping are small areas of the moderately well drained Hiles, somewhat poorly drained Merrillan, and poorly drained Vesper soils. Hiles soils are in the slightly higher positions on the landscape. Merrillan soils are in positions similar to those of the Kert soil. They have less clay in the subsoil than the Kert soil and are underlain by interbedded sandstone and shale. Vesper soils are in drainageways. Also included are areas of soils that are underlain by sandstone at a depth of 40 to 60 inches. Included soils make up 5 to 10 percent of the unit.

Permeability is moderate or moderately rapid in the silty mantle of the Kert soil and slow in the subsoil and substratum. The available water capacity is moderate. The organic matter content is moderate in the surface layer. This layer is friable and can be easily tilled, but it tends to crust and puddle after hard rains or if it is tilled when too wet. The rooting depth of most crops is limited by a seasonal high water table, which is at a depth 1 to 3 feet in undrained areas.

Most areas are used as cropland. A few are used as pasture or woodland. If drained, this soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, water erosion is a slight or moderate hazard. It can be controlled by contour farming, contour stripcropping, conservation tillage, and grassed waterways. Land smoothing, surface drains, diversions, and interceptor subsurface drains help to remove excess water. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazards of erosion and soil blowing.

A cover of pasture plants is effective in controlling erosion (fig. 6). The surface layer is subject to crusting, which restricts the emergence of the plants. Alfalfa is generally short lived because of the seasonal high water table and the winterkill caused by frost heave. Red clover is generally grown. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, pasture rotation, measures that improve fertility, and restricted use during wet periods help to keep the pasture in good condition.

This soil is suited to trees. The equipment limitation and the windthrow hazard are management concerns. Because of the wetness, hand planting or machine planting on prepared ridges generally is needed if natural regeneration is unreliable. Selection of vigorous nursery stock for planting reduces the seedling mortality rate. Harvesting is frequently limited to periods when the ground is frozen. Harvesting by clearcut or area-selection methods helps to prevent windthrow of the remaining trees. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

Because of the wetness and the slow permeability, this soil is poorly suited to septic tank absorption fields. Mounding the site with suitable filtering material helps to overcome these limitations. Also, the effluent can be pumped to an absorption field on a better suited soil in some nearby areas.

Because of the wetness, this soil is poorly suited to dwellings. This limitation can be overcome by constructing foundations on coarse textured fill material above the level of wetness and by installing tile drains around the foundations and providing gravity outlets or other dependable outlets.

Because of the potential for frost action, this soil is poorly suited to local roads and streets. Replacing the upper part of the soil with coarse textured base material, such as sand or gravel, helps to prevent the damage caused by frost action.

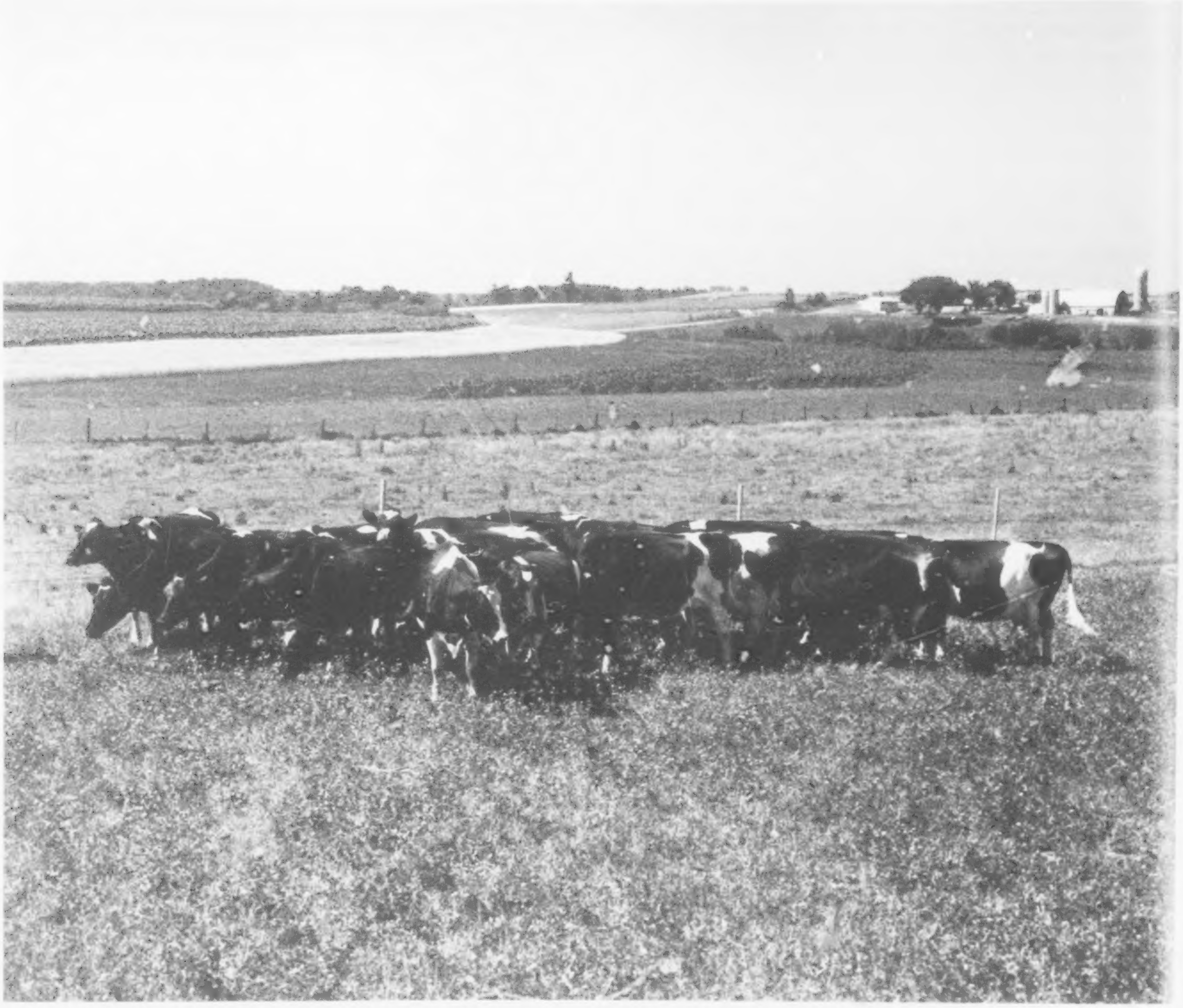

Figure 6.—A pastured area of Kert silt loam, 1 to 6 percent slopes.

The land capability classification is IIe. The woodland ordination symbol is 4W.

La—Lows loam, 0 to 2 percent slopes. This deep, nearly level, poorly drained soil is in plane or slightly concave areas in drainageways on stream terraces and valley fills. It is subject to ponding. Individual areas are irregular in shape and generally range from 5 to 100 acres in size.

Typically, the surface layer is very dark gray loam about 9 inches thick. The subsurface layer is gray, mottled loam about 7 inches thick. The subsoil is about 23 inches thick. It is mottled and friable. The upper part is gray loam and silt loam, and the lower part is light brownish gray sandy loam. The substratum to a depth o about 60 inches is gray sand. In places the surface laye is sandy loam or silt loam. In some areas the substratum has loamy strata.

Included with this soil in mapping are small areas of the somewhat poorly drained Shiffer soils. These soils are in the slightly higher positions on the landscape. They make up 2 to 5 percent of the unit.

Permeability is moderate in the subsoil of the Lows soil and rapid in the substratum. The available water capacity is moderate. The organic matter content is moderate or high in the surface layer. This layer is friable but tends to crust or puddle after hard rains or if it is tilled when too wet. The rooting depth of most crops is limited by a seasonal high water table, which is near or above the surface in undrained areas.

Most areas are used as cropland. A few are used as pasture or woodland. If drained, this soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Land smoothing, surface drains, interceptor subsurface drains, and grassed waterways help to remove excess water. If tile drains are installed, silt and the finer sand enter the tile lines unless a suitable filter is used to cover the tile. Applying a system of conservation tillage and returning crop residue to the soil or adding other organic material help to maintain fertility and good tilth and increase the rate of water infiltration.

This soil is suited to pasture. Alfalfa is generally short lived unless the soil is adequately drained and protected from ponding. Red clover is generally grown. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, pasture rotation, measures that improve fertility, and restricted use during wet periods help to keep the pasture in good condition.

This soil is suited to trees. The equipment limitation, seedling mortality, and the windthrow hazard are management concerns. Because of the wetness, hand planting or machine planting on prepared ridges generally is needed if natural regeneration is unreliable. Selection of vigorous nursery stock for planting reduces the seedling mortality rate. Harvesting is frequently limited to periods when the ground is frozen. Harvesting by clearcut or area-selection methods helps to prevent windthrow of the remaining trees. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

This soil generally is not suitable as a site for septic tank absorption fields, dwellings, or local roads and streets, mainly because of the ponding. Overcoming this hazard is difficult. A better suited site should be considered.

The land capability classification is IIw in drained areas. The woodland ordination symbol is 2W.

LoB—Loyal silt loam, 2 to 6 percent slopes. This deep, gently sloping, moderately well drained soil is on side slopes and knolls on ground moraines. Individual areas are irregular in shape and generally range from 10 to 100 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 8 inches thick. The subsurface layer is mostly brown and pale brown silt loam about 8 inches thick. The subsoil is about 28 inches thick. It is mostly brown, mottled, friable silt loam in the upper part and reddish brown, mottled, firm loam in the lower part. The substratum to a depth of about 60 inches is reddish brown, mottled loam. In places cobbles are on the surface. In some areas the slope is more than 6 percent.

Included with this soil in mapping are small areas of the somewhat poorly drained Withee soils. These soils are in the slightly lower positions on the landscape. They make up 5 to 15 percent of the unit.

Permeability is moderate in the Loyal soil. The available water capacity is high. The organic matter content is moderately low or moderate in the surface layer. This layer is friable and can be easily tilled, but it tends to crust and puddle after hard rains or if it is tilled when too wet. The depth to the seasonal high water table ranges from 2.5 to 6.0 feet.

Most areas are used as cropland. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, water erosion is a slight or moderate hazard. It can be controlled by diversions, contour farming, contour stripcropping, conservation tillage, and grassed waterways. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazard of erosion.

A cover of pasture plants is effective in controlling erosion. The surface layer is subject to crusting, which restricts the emergence of the plants. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, measures that improve fertility, and restricted use during wet periods help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

Because of the wetness, this soil is poorly suited to septic tank absorption fields. This limitation can be overcome by mounding the site with suitable filtering material. Also, the effluent can be pumped to an absorption field on a better suited soil in some nearby areas.

This soil is suited to dwellings without basements, but it is only moderately suited to dwellings with basements because of the wetness. This limitation can be overcome by installing tile drains around the foundation and providing gravity outlets or other dependable outlets and by constructing the foundation on coarse textured fill material above the level of wetness.

Because of the potential for frost action, this soil is only moderately suited to local roads and streets. This limitation can be overcome by replacing the upper part of the soil with coarse textured base material, such as sand or gravel.

The land capability classification is IIe. The woodland ordination symbol is 3A.

LoC2—Loyal silt loam, 6 to 12 percent slopes, eroded. This deep, sloping, moderately well drained soil is on side slopes on ground moraines. Individual areas are irregular in shape and generally range from 5 to 60 acres in size.

In most cultivated areas on the crest of hills and the upper side slopes, erosion has removed most of the original surface layer. Typically, the remaining surface layer is dark grayish brown silt loam about 8 inches thick. The subsurface layer is mostly brown silt loam about 7 inches thick. The subsoil is about 29 inches thick. It is mostly dark brown and dark yellowish brown, mottled, friable silt loam in the upper part and reddish brown, mottled, firm loam in the lower part. The substratum to a depth of about 60 inches is reddish brown loam. In places cobbles are on the surface. In some areas the slope is less than 6 or more than 12 percent.

Included with this soil in mapping are small areas of the moderately well drained Hiles soils. These soils are in positions on the landscape similar to those of the Loyal soil. They formed in silty deposits and in material weathered from stratified sandstone and shale. They make up 5 to 15 percent of the unit.

Permeability is moderate in the Loyal soil. The available water capacity is high. The organic matter content is moderately low or moderate in the surface layer. This layer is friable and can be easily tilled, but it tends to crust and puddle after hard rains or if it is tilled when too wet. The depth to the seasonal high water table ranges from 2.5 to 6.0 feet.

Most areas are used as cropland. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, water erosion is a moderate hazard. It can be controlled by diversions, grassed waterways, contour farming, contour stripcropping, and conservation tillage. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazard of erosion.

A cover of pasture plants is effective in controlling erosion. The surface layer is subject to crusting, which restricts the emergence of the plants. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, pasture rotation, measures that improve fertility, and restricted use during wet periods help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

Because of the wetness, this soil is poorly suited to septic tank absorption fields. This limitation can be overcome by mounding the site with suitable filtering material. Also, the effluent can be pumped to an absorption field on a better suited soil in some nearby areas.

Because of the slope, this soil is only moderately suited to dwellings. This limitation can be overcome by cutting and filling, by installing retaining walls, or by designing the dwellings so that one side of the basement fronts on the lower part of the slope. Also, the dwellings can be constructed in the included areas where the slope is less than 6 percent. The wetness is a limitation on sites for dwellings with basements. It can be overcome by constructing foundations on coarse textured fill material above the level of wetness and by installing tile drains around the foundations and providing gravity outlets or other dependable outlets.

Because of the slope and the potential for frost action, this soil is only moderately suited to local roads and streets. The slope can be overcome by shaping the roadway through cutting and filling. Also, the road can be built in the less sloping areas. Replacing the upper part of the soil with coarse textured base material, such as sand or gravel, helps to prevent the damage caused by frost action.

The land capability classification is IIIe. The woodland ordination symbol is 3A.

Lp—Lupton muck, 0 to 1 percent slopes. This deep, nearly level, very poorly drained soil is in depressions on ground moraines, outwash plains, and glacial lake plains. It is subject to ponding. Individual areas are irregular in shape and generally range from 10 to 160 acres in size.

Typically, the organic material is dark brown and very dark brown muck at least 60 inches thick. In places a thin layer of peat or sphagnum moss is at the surface.

Permeability is moderately rapid. The available water capacity is very high. The organic matter content also is very high. The rooting depth of most plants is limited by a seasonal high water table, which is near or above the surface in undrained areas.

Most areas support wetland vegetation. Because of the wetness, a scarcity of suitable drainage outlets, and the hazard of frost late in spring and early in fall, this soil is generally not suited to cultivated crops or to pasture. If drained and cultivated, it is subject to burning and subsidence. Also, it is subject to soil blowing.

This soil is poorly suited to trees. The trees grow so slowly poorly and are so poorly shaped that they are barely merchantable at best. The equipment limitation, seedling mortality, and the windthrow hazard are management concerns. Because of the wetness, hand planting or machine planting on prepared ridges generally is needed if natural regeneration is unreliable. Selection of vigorous nursery stock for planting reduces the seedling mortality rate. Harvesting is frequently limited to periods when the ground is frozen. Harvesting by clearcut or area-selection methods helps to prevent windthrow of the remaining trees. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation.

This soil generally is not suitable as a site for septic tank absorption fields, dwellings, or local roads and streets, mainly because of the ponding. Overcoming this hazard is difficult. A better suited site should be considered.

The land capability classification is VIw in undrained areas. The woodland ordination symbol is 3W.

MbB—Magnor silt loam, 1 to 6 percent slopes. This deep, nearly level and gently sloping, somewhat poorly drained soil is on side slopes and in drainageways on ground moraines. Individual areas are irregular in shape and generally range from 10 to 100 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 8 inches thick. The subsurface layer is mostly grayish brown, mottled silt loam about 6 inches thick. The subsoil is about 18 inches thick. It is mottled and friable. The upper part is mostly dark brown silt loam, the next part is dark brown sandy loam, and the lower part is reddish brown loam. The substratum to a depth of about 60 inches is reddish brown, mottled sandy loam. In places the surface layer is loam. In some areas the slope is more than 6 percent.

Included with this soil in mapping are small areas of the somewhat poorly drained Almena and moderately well drained Freeon soils. Almena soils are in positions on the landscape similar to those of the Magnor soil. They have a silty mantle that is thicker than that of the Magnor soil. Freeon soils are in the higher positions on the landscape. Included soils make up 5 to 15 percent of the unit.

Permeability is moderately slow or moderate in the silty mantle of the Magnor soil and moderately slow in the lower part of the subsoil and in the substratum. The available water capacity is high. The organic matter content is moderately low or moderate in the surface layer. This layer is friable and can be easily tilled, but it tends to crust and puddle after hard rains or if it is tilled when too wet. The rooting depth of most crops is limited by a seasonal high water table, which is at a depth of 0.5 foot to 3.0 feet in undrained areas.

Most areas are used as cropland. A few are used as pasture or woodland. If drained, this soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, water erosion is a slight or moderate hazard. It can be controlled by conservation tillage, winter cover crops, and grassed waterways (fig. 7). Land smoothing, surface drains, and diversions help to remove excess water. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and helps to control erosion.

A cover of pasture plants is effective in controlling erosion. The surface layer is subject to crusting, which restricts the emergence of the plants. Alfalfa is generally short lived because of the seasonal high water table and the winterkill caused by frost heave. Red clover is generally grown. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, pasture rotation, measures that improve fertility, and restricted use during wet periods help to keep the pasture in good condition.

This soil is suited to trees. The equipment limitation and the windthrow hazard are management concerns. Because of the wetness, hand planting or machine planting on prepared ridges generally is needed if natural regeneration is unreliable. Selection of vigorous nursery stock for planting reduces the seedling mortality rate. Harvesting is frequently limited to periods when the ground is frozen. Harvesting by clearcut or area-selection methods helps to prevent windthrow of the remaining trees. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

Because of the wetness and the moderately slow permeability, this soil is poorly suited to septic tank absorption fields. Mounding the site with suitable filtering material helps to overcome these limitations. Also, the effluent can be pumped to an absorption field on a better suited soil in some nearby areas.

Because of the wetness, this soil is poorly suited to dwellings. This limitation can be overcome by constructing foundations on coarse textured fill material above the level of wetness and by installing tile drains around the foundations and providing gravity outlets or other dependable outlets.

Because of the wetness and the potential for frost action, this soil is poorly suited to local roads and

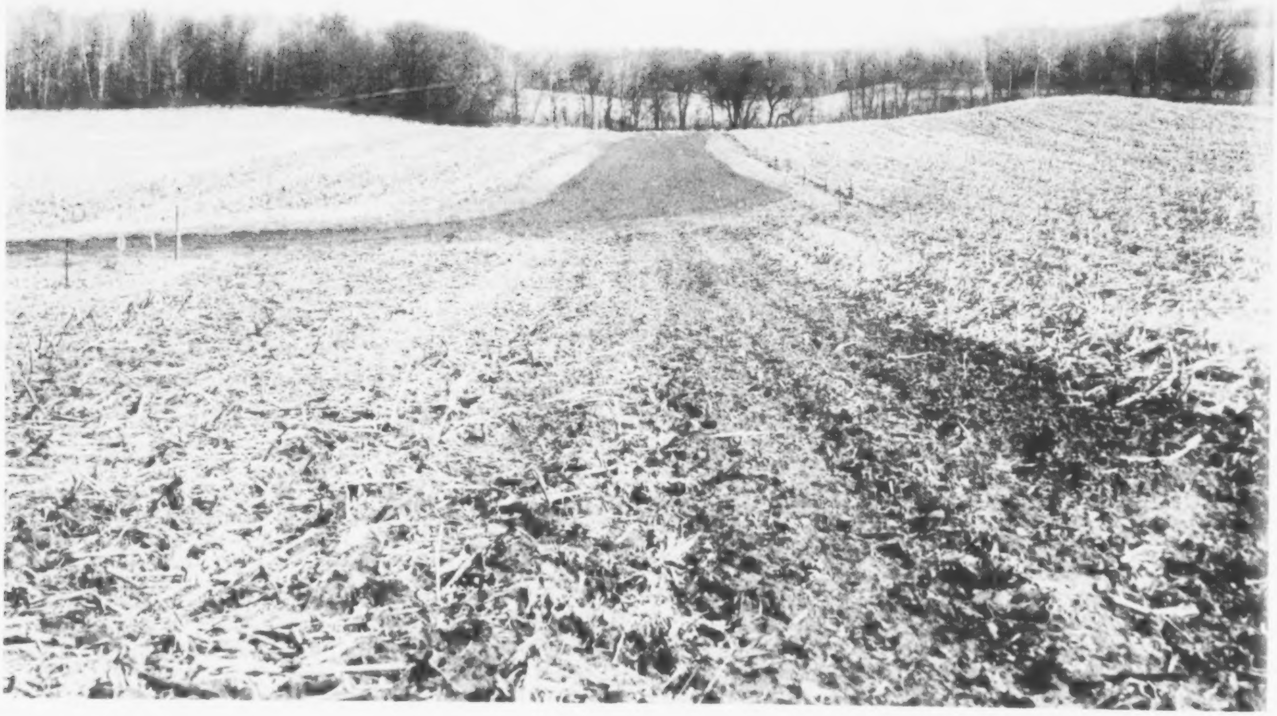

Figure 7.—A grassed waterway and a protective cover of crop residue in an area of Magnor silt loam, 1 to 6 percent slopes.

streets. Installing a subsurface drainage system and replacing the upper part of the soil with coarse textured base material, such as sand or gravel, help to prevent the damage caused by wetness and frost action.

The land capability classification is IIe. The woodland ordination symbol is 3W.

McB—Magnor silt loam, 1 to 6 percent slopes, stony. This deep, nearly level and gently sloping, somewhat poorly drained soil is on side slopes and in drainageways on ground moraines. Stones are on the surface. They commonly are 10 to 24 inches in diameter. Individual areas are irregular in shape and generally range from 5 to 50 acres in size.

Typically, the surface layer is very dark gray silt loam about 4 inches thick. It contains stones. The subsurface layer is grayish brown, mottled silt loam about 7 inches thick. The subsoil is about 21 inches thick. It is mottled and friable. The upper part is mostly brown silt loam, the next part is brown loam, and the lower part is reddish brown sandy loam. The substratum to a depth of about 60 inches also is reddish brown sandy loam. In places the surface layer is loam or sandy loam. In some areas the slope is more than 6 percent.

Included with this soil in mapping are small areas of the poorly drained Auburndale and moderately well drained Freeon soils. Auburndale soils have a silty mantle that is thicker than that of the Magnor soil. They are in the lower positions on the landscape. Freeon soils are in the higher positions. Also included are a few small areas of Magnor soils that do not have stones on the surface. Included soils make up 5 to 15 percent of the unit.

Permeability is moderately slow or moderate in the silty mantle of this Magnor soil and moderately slow in the lower part of the subsoil and in the substratum. The available water capacity is high. The organic matter content is moderate or high in the surface layer. This layer is friable, but tillage is restricted by the stones on and below the surface. The rooting depth of most plants is limited by a seasonal high water table, which is at a depth of 0.5 foot to 3.0 feet in undrained areas.

Most areas are used as unimproved pasture. A few are wooded. This soil generally is unsuitable for cultivated crops because of the surface stones, which interfere with tillage. If the stones are removed, however, the soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, water erosion and wetness are management concerns.

This soil is suited to pasture, but the surface stones hinder or prevent the use of the machinery that helps to establish and maintain an improved pasture. The native vegetation generally is of poor quality for forage.

This soil is suited to trees. The equipment limitation and the windthrow hazard are management concerns. The use of planting and harvesting equipment is severely limited by the large number of stones on or below the surface and by the wetness. Harvesting is frequently limited to periods when the ground is frozen. Harvesting by clearcut or area-selection methods helps to prevent windthrow of the remaining trees. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

Because of the wetness and the slow permeability, this soil is poorly suited to septic tank absorption fields. Mounding the site with suitable filtering material helps to overcome these limitations. Also, the effluent can be pumped to an absorption field on a better suited soil in some nearby areas.

Because of the wetness, this soil is poorly suited to dwellings. This limitation can be overcome by constructing foundations on coarse textured fill material above the level of wetness and by installing tile drains around the foundations and providing gravity outlets or other dependable outlets.

Because of the wetness and the potential for frost action, this soil is poorly suited to local roads and streets. Installing a subsurface drainage system and replacing the upper part of the soil with coarse textured base material, such as sand or gravel, help to prevent the damage caused by wetness and frost action.

The land capability classification is VIs. The woodland ordination symbol is 3X.

MdB—Mahtomedi loamy sand, 2 to 6 percent slopes. This deep, gently sloping, excessively drained soil is in slightly convex areas on outwash plains. Individual areas are irregular in shape and generally range from 10 to 80 acres in size.

Typically, the surface layer is very dark grayish brown loamy sand about 8 inches thick. The subsoil is about 16 inches thick. It is reddish brown and very friable. It is loamy sand in the upper part and gravelly sand in the lower part. The substratum to a depth of about 60 inches is dark brown sand and gravel. In places the lower part of the subsoil is gravelly loamy sand. In some areas the slope is less than 2 or more than 6 percent.

Included with this soil in mapping are a few small areas of the well drained Rosholt soils. These soils are in positions on the landscape similar to those of the Mahtomedi soil. They have more clay in the surface layer and subsoil than the Mahtomedi soil. They make up 2 to 10 percent of the unit.

Permeability is rapid in the Mahtomedi soil. The available water capacity is low. Natural fertility also is low. The organic matter content is very low or low in the surface layer. This layer is very friable and can be easily tilled throughout a wide range of moisture content. The rooting depth of most crops is limited by droughtiness.

Most areas are used as cropland. Some have been planted to pine. A few support native trees. This soil is poorly suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If irrigated, however, it is suited to the commonly grown farm crops and to vegetables, such as snap beans, potatoes, sweet corn, and peas. In most years crop yields are limited by the low available water capacity. If cultivated crops are grown, water erosion is a slight hazard. Also, the soil is subject to soil blowing. Winter cover crops, conservation tillage, wind stripcropping, and field windbreaks help to prevent excessive soil loss. Returning crop residue to the soil or adding other organic material reduces the hazard of soil blowing and the amount of water lost through evaporation, increases the rate of water infiltration, and helps to maintain fertility.

A cover of pasture plants is effective in controlling soil blowing and water erosion. Forage yields are generally low unless fertilizer is applied and the supply of moisture is adequate. Planting early in spring, before the soil has a chance to dry out, helps to overcome the droughtiness. Planting later in the year is likely to result in a poor survival rate. Overgrazing can cause surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Measures that improve fertility, proper stocking rates, and pasture rotation help to keep the pasture in good condition.

This soil is suited to trees. The equipment limitation and seedling mortality are management concerns. Because of the loose sand, equipment with flotation tires or tracks can be operated more easily than other equipment. Seedling survival can be improved by careful planting of vigorous nursery stock. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

This soil is suited to dwellings and to local roads and streets. It readily absorbs the effluent in septic tank absorption fields. It does not adequately filter the effluent, however, because of the rapid permeability. The poor filtering capacity can result in the pollution of ground water.

The land capability classification is IVs. The woodland ordination symbol is 6S.

MdC—Mahtomedi loamy sand, 6 to 12 percent slopes. This deep, sloping, excessively drained soil is on convex side slopes and ridges on outwash plains. Individual areas are irregular in shape and generally range from 5 to 25 acres in size.

Typically, the surface layer is black loamy sand about 2 inches thick. The subsoil is about 22 inches thick. It is dark brown. It is very friable loamy sand in the upper part and loose sand in the lower part. The substratum to a depth of about 60 inches is brown sand and gravel. In some areas on knolls and side slopes, the surface layer is gravelly sand. In places the slope is less than 6 or more than 12 percent.

Included with this soil in mapping are a few small areas of the well drained Rosholt soils. These soils are in positions on the landscape similar to those of the Mahtomedi soil. They have more clay in the surface layer and subsoil than the Mahtomedi soil. They make up 5 to 15 percent of the unit.

Permeability is rapid in the Mahtomedi soil. The available water capacity is low. Natural fertility also is low. The organic matter content is very low or low in the surface layer. This layer is very friable and can be easily tilled throughout a wide range of moisture content. The rooting depth of most crops is limited by droughtiness.

Most areas are wooded. Some have been planted to pine. This soil is poorly suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. In most years crop yields are limited by the low available water capacity. If cultivated crops are grown, water erosion is a moderate hazard. Also, the soil is subject to soil blowing. Winter cover crops, conservation tillage, and field windbreaks help to control erosion and soil blowing. Most areas have slopes that are too short and irregular to be stripcropped or cultivated on the contour. Returning crop residue to the soil or adding other organic material reduces the hazards of erosion and soil blowing and the amount of water lost through evaporation, increases the rate of water infiltration, and helps to maintain fertility.

A cover of pasture plants is effective in controlling soil blowing and water erosion. Forage yields are generally low unless fertilizer is applied and the supply of moisture is adequate. Planting early in spring, before the soil has a chance to dry out, helps to overcome the droughtiness. Planting later in the year is likely to result in a poor survival rate. Overgrazing can cause surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Measures that improve fertility, proper stocking rates, and pasture rotation help to keep the pasture in good condition.

This soil is suited to trees. The equipment limitation and seedling mortality are management concerns. Because of the loose sand, equipment with flotation tires or tracks can be operated more easily than other equipment. Seedling survival can be improved by careful planting of vigorous nursery stock. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

This soil readily absorbs the effluent in septic tank absorption fields. It does not adequately filter the effluent, however, because of the rapid permeability. The poor filtering capacity can result in the pollution of ground water.

Because of the slope, this soil is only moderately suited to dwellings. This limitation can be overcome by cutting and filling, by installing retaining walls, or by designing the dwellings so that one side of the basement fronts on the lower part of the slope. Also, the dwellings can be constructed in the included areas where the slope is less than 6 percent.

Because of the slope, this soil is only moderately suited to local roads and streets. This limitation can be overcome by shaping the roadway through cutting and filling. Also, the road can be built in the less sloping areas.

The land capability classification is IVs. The woodland ordination symbol is 6S.

Me—Markey muck, 0 to 1 percent slopes. This deep, nearly level, very poorly drained soil is in depressions on outwash plains and ground moraines. It is subject to ponding. Individual areas are elongated and generally range from 20 to 120 acres in size.

Typically, the upper 36 inches is dark brown and black muck. The substratum to a depth of about 60 inches is gray sand. In some areas the organic material has strata of peat or mucky peat. In other areas it is less than 16 inches thick.

Included with this soil in mapping are small areas of the poorly drained and very poorly drained Fordum and Newson soils and the very poorly drained Lupton soils. Fordum and Newson soils are in the slightly higher areas. Fordum soils are stratified and typically are loamy in the upper part. Newson soils formed in sandy deposits. Lupton soils are in positions on the landscape similar to those of the Markey soil. They formed in extremely acid organic material. Included soils make up 5 to 10 percent of the unit.

Permeability is moderately rapid in the organic part of the Markey soil and rapid in the substratum. The available water capacity is very high. The organic matter content also is very high. The rooting depth of most plants is limited by a seasonal high water table, which is near or above the surface in undrained areas.

Most areas support wetland vegetation. A few have been drained and are used as cropland. Because of the wetness, a scarcity of suitable drainage outlets, and the hazard of frost late in spring and early in fall, this soil is generally not suited to cultivated crops or to pasture. If drained and cultivated, it is subject to burning and subsidence. It also is subject to soil blowing.

This soil is poorly suited to trees. The trees grow so poorly and are so poorly shaped that they are barely merchantable at best. The equipment limitation, seedling mortality, and the windthrow hazard are management concerns. Because of the wetness, hand planting or machine planting on prepared ridges generally is needed if natural regeneration is unreliable. Selection of vigorous nursery stock for planting reduces the seedling mortality rate. Harvesting is frequently limited to periods when the ground is frozen. Harvesting by clearcut or area-selection methods helps to prevent windthrow of the remaining trees. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation.

This soil generally is not suitable as a site for septic tank absorption fields, dwellings, or local roads and streets, mainly because of the ponding. Overcoming this hazard is difficult. A better suited site should be considered.

The land capability classification is VIw in undrained areas. The woodland ordination symbol is 4W.

Mh—Meehan loamy sand, 0 to 2 percent slopes. This deep, nearly level, somewhat poorly drained soil is in shallow depressions on outwash plains. Individual areas are elongated and generally range from 5 to 40 acres in size.

Typically, the surface layer is very dark grayish brown loamy sand about 8 inches thick. The subsoil is very friable and loose sand about 22 inches thick. The upper part is brown, and the lower part is pale brown and light brownish gray and is mottled. The substratum to a depth of about 60 inches is light brownish gray sand. In places it has strata of loamy sand less than 1 inch thick.

Included with this soil in mapping are small areas of the moderately well drained Friendship and poorly drained and very poorly drained Newson soils. Friendship soils are in the slightly higher positions on the landscape. Newson soils are in the lower positions. Included soils make up 10 to 15 percent of the unit.

Permeability is rapid in the Meehan soil. The available water capacity is low. Natural fertility also is low. The organic matter content is low to moderate in the surface layer. This layer is very friable and can be easily tilled throughout a wide range of moisture content. The rooting depth of most crops is limited by a seasonal high water table, which is at a depth of 1 to 3 feet in undrained areas.

Most areas are used as cropland. A few are used as pasture. If drained, the soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Excess water can be removed by diversions, grassed waterways, surface drains, and drainage tile. If the water table is excessively lowered, however, crop yields in most years are limited by the low available water capacity. If tile drains are installed, the finer sand enters the tile lines unless a suitable filter covers the tile. In areas that are drained and cultivated, soil blowing is a hazard. It can be controlled by wind stripcropping, field windbreaks, and conservation tillage. Returning crop residue to the soil or adding other organic material reduces the hazard of soil blowing and the amount of water lost through evaporation, increases the rate of water infiltration, and helps to maintain fertility.

A cover of pasture plants is effective in controlling soil blowing. Forage yields are generally low unless fertilizer is applied and an adequate amount of moisture is supplied either through a controlled drainage system or through irrigation. Alfalfa is short lived unless the soil is drained. Red clover is generally grown. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is suited to trees. The equipment limitation, seedling mortality, and the windthrow hazard are management concerns. Because of the wetness, hand planting or machine planting on prepared ridges is generally needed if natural regeneration is unreliable. Selection of vigorous nursery stock for planting reduces the seedling mortality rate. Harvesting is frequently limited to periods when the ground is frozen. Harvesting by clearcut or area-selection methods helps to prevent windthrow of the remaining trees. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

This soil readily absorbs the effluent in septic tank absorption fields. It does not adequately filter the effluent, however, because of the rapid permeability. The poor filtering capacity can result in the pollution of ground water. The wetness also is a limitation. Mounding the site with suitable filtering material helps to overcome the wetness and the poor filtering capacity. Also, the effluent can be pumped to an absorption field on a better suited soil in some nearby areas.

Because of the wetness, this soil is poorly suited to dwellings. This limitation can be overcome by installing tile drains around foundations and providing gravity outlets or other dependable outlets and by constructing the foundations on coarse textured fill material above the level of wetness.

Because of the wetness and the potential for frost action, this soil is only moderately suited to local roads and streets. Installing a subsurface drainage system and replacing the upper part of the soil with coarse textured base material, such as sand or gravel, help to prevent the damage caused by wetness and frost action.

The land capability classification is IVw. The woodland ordination symbol is 5W.

MkB—Menahga loamy sand, 0 to 6 percent slopes. This deep, nearly level and gently sloping, excessively drained soil is in plane and slightly convex areas on outwash plains. Individual areas are irregular in shape and generally range from 10 to 80 acres in size.

Typically, the surface layer is very dark grayish brown loamy sand about 8 inches thick. The subsoil is dark yellowish brown, strong brown, and yellowish brown, very friable and loose sand about 32 inches thick. The substratum to a depth of about 60 inches is brownish yellow sand. In places the surface layer is loamy fine sand or sand. In some areas the substratum is gravelly sand or has loamy or silty strata.

Included with this soil in mapping are small areas of the moderately well drained Friendship and excessively drained Plainbo soils. Friendship soils are in the slightly lower positions on the landscape. Plainbo soils are in the slightly higher positions. They are underlain by sandstone. Included soils make up 2 to 10 percent of the unit.

Permeability is rapid in the Menahga soil. The available water capacity is low. Natural fertility also is low. The organic matter content is low or moderately low in the surface layer. This layer is very friable and can be easily tilled throughout a wide range of moisture content. The rooting depth of most crops is limited by droughtiness.

Most areas are used as cropland. Some have been planted to pine. A few support native trees. This soil is poorly suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If irrigated, however, it is suited to the commonly grown farm crops and to vegetables, such as snap beans, potatoes, sweet corn, and peas. In most years crop yields are limited by the low available water capacity. If cultivated crops are grown, water erosion is a slight hazard. Also, the soil is subject to soil blowing. Winter cover crops, conservation tillage, wind stripcropping, and field windbreaks help to prevent excessive soil loss. Returning crop residue to the soil or adding other organic material reduces the hazard of soil blowing and the amount of water lost through evaporation, increases the rate of water infiltration, and helps to maintain fertility.

A cover of pasture plants is effective in controlling soil blowing and water erosion. Forage yields are generally low unless fertilizer is applied and the supply of moisture is adequate. Planting early in spring, before the soil has a chance to dry out, helps to overcome the droughtiness. Planting later in the year is likely to result in a poor survival rate. Overgrazing can cause surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Measures that improve fertility, proper stocking rates, and pasture rotation help to keep the pasture in good condition.

This soil is suited to trees. The equipment limitation and seedling mortality are management concerns. Because of the loose sand, equipment with flotation tires or tracks can be operated more easily than other equipment. Seedling survival can be improved by careful planting of vigorous nursery stock. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

This soil is suited to dwellings and to local road and streets. It readily absorbs the effluent in septic tank absorption fields. It does not adequately filter the effluent, however, because of the rapid permeability. The poor filtering capacity can result in the pollution of ground water.

The land capability classification is IVs. The woodland ordination symbol is 6S.

MkC—Menahga loamy sand, 6 to 12 percent slopes. This deep, sloping, excessively drained soil is on side slopes on outwash plains. Individual areas are irregular in shape and generally range from 5 to 40 acres in size.

Typically, the surface layer is dark grayish brown loamy sand about 6 inches thick. The subsoil is brown and dark yellowish brown, very friable sand about 34 inches thick. The substratum to a depth of about 60 inches is light yellowish brown sand. In places it is sand and gravel or has loamy or silty strata. In some areas the slope is less than 6 or more than 12 percent.

Included with this soil in mapping are small areas of the excessively drained Plainbo soils. These soils are underlain by sandstone. They are in the slightly higher positions on the landscape. They make up 2 to 10 percent of the unit.

Permeability is rapid in the Menagha soil. The available water capacity is low. Natural fertility also is low. The organic matter content is low or moderately low in the surface layer. This layer is very friable and can be easily tilled throughout a wide range of moisture content. The rooting depth of most crops is limited by droughtiness.

Most areas are wooded. Some have been planted to pine. A few are used as cropland. This soil is poorly suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. In most years crop yields are limited by the low available water capacity. If cultivated crops are grown, water erosion is a moderate hazard. Also, the soil is subject to soil blowing. Winter cover crops, wind stripcropping, conservation tillage, and field windbreaks help to control erosion and soil blowing. Returning crop residue to the soil or adding other organic material reduces the hazard of soil blowing and the amount of water lost through evaporation, increases the rate of water infiltration, and helps to maintain fertility.

A cover of pasture plants is effective in controlling soil blowing and water erosion. Forage yields are generally low unless fertilizer is applied and the supply of moisture is adequate. Planting early in spring, before the soil has a chance to dry out, helps to overcome the droughtiness. Planting later in the year is likely to result in a poor survival rate. Overgrazing can cause surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Measures that improve fertility, proper stocking rates, and pasture rotation help to keep the pasture in good condition.

This soil is suited to trees. The equipment limitation and seedling mortality are management concerns. Because of the loose sand, equipment with flotation tires or tracks can be operated more easily than other equipment. Seedling survival can be improved by careful planting of vigorous nursery stock. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

This soil readily absorbs the effluent in septic tank absorption fields. It does not adequately filter the effluent, however, because of the rapid permeability. The poor filtering capacity can result in the pollution of ground water.

Because of the slope, this soil is only moderately suited to dwellings. This limitation can be overcome by cutting and filling, by installing retaining walls, or by designing the dwellings so that one side of the basement fronts on the lower part of the slope. Also, the dwellings can be constructed in the included areas where the slope is less than 6 percent.

Because of the slope, this soil is only moderately suited to local roads and streets. This limitation can be overcome by shaping the roadway through cutting and filling. Also, the road can be built in the less sloping areas.

The land capability classification is IVs. The woodland ordination symbol is 6S.

MIA—Meridian loam, 0 to 2 percent slopes. This deep, nearly level, well drained soil is in plane areas on stream terraces and valley fills. Individual areas are irregular in shape and generally range from 5 to 80 acres in size.

Typically, the surface layer is very dark grayish brown loam about 9 inches thick. The subsoil is about 28 inches thick. It is friable. It is brown loam in the upper part and dark yellowish brown sandy loam in the lower part. The substratum to a depth of about 60 inches is yellowish brown sand.

Included with this soil in mapping are small areas of the well drained Billett and moderately well drained Meridian soils. Billett soils are in positions on the landscape similar to those of this Meridian soil. They have less clay in the surface layer and subsoil than the Meridian soil. The wetter Meridian soils are in the slightly lower positions on the landscape. Included soils make up 5 to 10 percent of the unit.

Permeability is moderate or moderately rapid in the subsoil of this Meridian soil and rapid in the substratum. The available water capacity is moderate. The organic matter content is moderate in the surface layer. This layer is friable and can be easily tilled throughout a wide range of moisture content. The rooting depth of most crops is limited by droughtiness in the sandy substratum.

Most areas are used as cropland. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Applying a system of conservation tillage and returning crop residue to the soil or adding other organic material help to maintain fertility and good tilth and increase the rate of water infiltration.

This soil is suited to pasture. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, pasture rotation, measures that improve fertility, and restricted use during wet periods help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

This soil is suited to dwellings. It readily absorbs the effluent in septic tank absorption fields. It does not adequately filter the effluent, however, because of the rapid permeability in the substratum. The poor filtering capacity can result in the pollution of ground water.

This soil is only moderately suited to local roads and streets because of the potential for frost action. Replacing the upper part of the soil with coarse textured base material, such as sand or gravel, helps to prevent the damage caused by frost action.

The land capability classification is IIs. The woodland ordination symbol is 4A.

MlB—Meridian loam, 2 to 6 percent slopes. This deep, gently sloping, well drained soil is in slightly convex areas on stream terraces and valley fills. Individual areas are irregular in shape and generally range from 5 to 100 acres in size.

Typically, the surface layer is very dark grayish brown loam about 9 inches thick. The subsoil is dark brown and brown, friable loam about 26 inches thick. The substratum to a depth of about 60 inches is yellowish brown sand. In places the slope is less than 2 or more than 6 percent.

Included with this soil in mapping are small areas of the well drained Billett and moderately well drained Meridian soils. Billett soils are in positions on the landscape similar to those of this Meridian soil. They have less clay in the surface layer and subsoil than the Meridian soil. The wetter Meridian soils are in the slightly lower positions on the landscape. Included soils make up 5 to 10 percent of the unit.

Permeability is moderate or moderately rapid in the subsoil of this Meridian soil and rapid in the substratum. The available water capacity is moderate. The organic matter content is moderate in the surface layer. This layer is friable and can be easily tilled throughout a wide range of moisture content. The rooting depth of most crops is limited by droughtiness in the sandy substratum.

Most areas are used as cropland. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, water erosion is a slight or moderate hazard. It can be controlled by grassed waterways, contour farming, contour stripcropping, and conservation tillage. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazard of erosion.

A cover of pasture plants is effective in controlling erosion. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, pasture rotation, measures that improve fertility, and restricted use during wet periods help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

This soil is suited to dwellings. It readily absorbs the effluent in septic tank absorption fields. It does not adequately filter the effluent, however, because of the rapid permeability in the substratum. The poor filtering capacity can result in the pollution of ground water.

This soil is only moderately suited to local roads and streets because of the potential for frost action. Replacing the upper part of the soil with coarse textured base material, such as sand or gravel, helps to prevent the damage caused by frost action.

The land capability classification is IIe. The woodland ordination symbol is 4A.

MmA—Meridian loam, moderately well drained, 0 to 3 percent slopes. This deep, nearly level and gently sloping, moderately well drained soil is in plane areas on stream terraces and valley fills. Individual areas are irregular in shape and generally range from 5 to 40 acres in size.

Typically, the surface layer is very dark grayish brown loam about 9 inches thick. The subsurface layer is brown loam about 5 inches thick. The subsoil is about 18 inches thick. It is dark yellowish brown, mottled, and friable. It is loam in the upper part and sandy loam in the lower part. The substratum to a depth of about 60 inches is yellowish brown sand.

Included with this soil in mapping are small areas of the well drained Meridian and somewhat poorly drained Shiffer soils. The better drained Meridian soils are in the slightly higher positions on the landscape. Shiffer soils are in the slightly lower positions. Included soils make up 2 to 8 percent of the unit.

Permeability is moderate or moderately rapid in the subsoil of this Meridian soil and rapid in the substratum. The available water capacity is moderate. The organic matter content is moderate in the surface layer. This layer is friable and can be easily tilled throughout a wide range of moisture content. The rooting depth of most crops is limited by droughtiness in the sandy substratum. The depth to the seasonal high water table ranges from 3 to 6 feet.

Most areas are used as cropland. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Applying a system of conservation tillage and returning crop residue to the soil or adding other organic material help to maintain fertility and good tilth and increase the rate of water infiltration.

This soil is suited to pasture. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, pasture rotation, measures that improve fertility, and restricted use during wet periods help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

This soil readily absorbs the effluent in septic tank absorption fields. It does not adequately filter the effluent, however, because of the rapid permeability in the substratum. The poor filtering capacity can result in the pollution of ground water. The wetness also is a limitation. Mounding the site with suitable filtering material helps to overcome the wetness and the poor filtering capacity. Also, the effluent can be pumped to an absorption field on a better suited soil in some nearby areas.

This soil is suited to dwellings without basements, but it is only moderately suited to dwellings with basements because of the wetness. This limitation can be overcome by installing tile drains around foundations and providing gravity outlets or other dependable outlets and by constructing the foundations on coarse textured fill material above the level of wetness.

Because of the potential for frost action, this soil is only moderately suited to local roads and streets. Replacing the upper part of the soil with coarse textured base material, such as sand or gravel, helps to prevent the damage caused by frost action.

The land capability classification is IIs. The woodland ordination symbol is 4A.

MrB—Merrillan sandy loam, 1 to 6 percent slopes. This moderately deep, nearly level and gently sloping, somewhat poorly drained soil is on foot slopes and side slopes in the uplands. Individual areas are irregular in shape and generally range from 3 to 120 acres in size.

Typically, the surface layer is very dark grayish brown sandy loam about 7 inches thick. The subsurface layer is brown, mottled sandy loam about 4 inches thick. The subsoil is about 17 inches thick. It is mottled. The upper part is dark brown and grayish brown, friable sandy loam; the next part is grayish brown, friable loam; and the lower part is gray, firm clay loam. The substratum is greenish gray and reddish brown silty clay about 20 inches thick. Poorly cemented sandstone interbedded with shale is at a depth of about 48 inches. In places the surface layer is loam or loamy sand.

Included with this soil in mapping are small areas of the poorly drained Elm Lake and moderately well drained Humbird soils. Elm Lake soils have a sandy mantle. They are in the lower positions on the landscape. Humbird soils are in the slightly higher positions. Included soils make up 1 to 10 percent of the unit.

Permeability is moderate in the upper part of the subsoil in the Merrillan soil and slow in the lower part and in the substratum. The available water capacity is moderate. The organic matter content is moderately low in the surface layer. This layer is friable and can be easily tilled throughout a wide range of moisture content. The rooting depth of most crops is limited by a seasonal high water table, which is at a depth of 1 to 3 feet in undrained areas.

Most areas are used as cropland. A few are wooded. If drained, this soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, water erosion is a slight or moderate hazard. Also, soil blowing is a hazard. Applying a system of conservation tillage and returning crop residue to the soil or adding other organic material help to maintain fertility and good tilth and increase the rate of water infiltration. Land smoothing, a surface drainage system, diversions, and interceptor subsurface drains help to remove excess water.

A cover of pasture plants is effective in controlling water erosion and soil blowing. Alfalfa is generally short lived unless the soil is adequately drained. Overgrazing or grazing when the soil is wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, measures that improve fertility, pasture rotation, and timely deferment of grazing help to keep the pasture in good condition.

This soil is suited to trees. The equipment limitation and the windthrow hazard are management concerns. Because of the wetness, hand planting or machine planting on prepared ridges generally is needed if natural regeneration is unreliable. Selection of vigorous nursery stock for planting reduces the seeding mortality rate. Harvesting is frequently limited to periods when the ground is frozen. Harvesting by clearcut or area-selection methods helps to prevent windthrow of the remaining trees. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

Because of the depth to bedrock, the wetness, and the slow permeability in the substratum, this soil is poorly suited to septic tank absorption fields. Mounding the site with suitable filtering material helps to overcome these limitations. Also, the effluent can be pumped to an absorption field on a better suited soil in some nearby areas.

Because of the wetness, this soil is poorly suited to dwellings. This limitation can be overcome by constructing foundations on coarse textured fill material above the level of wetness and by installing tile drains around the foundations and providing gravity outlets or other dependable outlets.

Because of low strength and the potential for frost action, this soil is poorly suited to local roads and streets. Low strength can be overcome by replacing the upper part of the soil with coarse textured base material, such as sand or gravel, and by increasing the thickness of the pavement or base material. Installing a subsurface drainage system and replacing the upper part of the soil with coarse textured base material help to prevent the damage caused by frost action.

The land capability classification is IIIe. The woodland ordination symbol is 4W.

Mu—Minocqua loam, 0 to 2 percent slopes. This deep, nearly level, poorly drained and very poorly drained soil is in drainageways on outwash plains. It is subject to ponding. Individual areas are round or elongated and generally range from 3 to 30 acres in size.

Typically, the surface layer is black loam about 9 inches thick. The subsoil is about 29 inches thick. It is grayish brown, mottled, very friable sandy loam in the upper part and gray, friable loam in the lower part. The substratum to a depth of about 60 inches is dark brown sand and gravel. In places the surface layer is mucky loam or mucky sandy loam.

Included with this soil in mapping are small areas of the somewhat poorly drained Halder, Oesterle, and Warman Variant soils. These soils are in the higher positions on the landscape. Halder soils have more clay in the upper part of the subsoil than the Minocqua soil. Warman Variant soils are sandy in the lower part of the subsoil. Included soils make up 5 to 10 percent of the unit.

Permeability is moderate in the subsoil of the Minocqua soil and rapid or very rapid in the substratum. The available water capacity is moderate. The organic matter content is high or very high in the surface layer. The rooting depth of most plants is limited by a seasonal high water table, which is near or above the surface in undrained areas.

Most areas are used as unimproved pasture or support wetland vegetation. Because of the ponding and a scarcity of suitable drainage outlets, this soil is generally not suited to cultivated crops. If drained and protected from ponding, it is suited to the commonly grown farm crops. It is poorly suited to pasture unless it is drained. Establishing or maintaining an improved pasture is difficult because of the wetness. Grazing is limited to short periods when the soil is dry. The native vegetation is generally of poor quality for forage.

This soil is suited to trees. The equipment limitation, seedling mortality, and the windthrow hazard are management concerns. Because of the wetness, hand planting or machine planting on prepared ridges is needed if natural regeneration is unreliable. Selection of vigorous nursery stock for planting reduces the seedling mortality rate. Harvesting is frequently limited to periods when the ground is frozen. Harvesting by clearcut or area-selection methods helps to prevent windthrow of the remaining trees. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

This soil generally is not suitable as a site for septic tank absorption fields, dwellings, or local roads and streets, mainly because of the ponding. Overcoming this hazard is difficult. A better suited site should be considered.

The land capability classification is VIw in undrained areas. The woodland ordination symbol is 7W.

MvA—Moundville loamy sand, 0 to 3 percent slopes. This deep, nearly level and gently sloping, moderately well drained soil is on stream terraces and outwash plains. Individual areas are irregular in shape and generally range from 5 to 160 acres in size.

Typically, the surface layer is very dark grayish brown loamy sand about 9 inches thick. The subsoil is about 25 inches thick. The upper part is brown, very friable loamy sand; the next part is strong brown, mottled, very friable loamy sand; and the lower part is dark yellowish brown, mottled, loose sand. The substratum to a depth of about 60 inches is brown and yellowish brown, mottled loamy sand and sand.

Included with this soil in mapping are small areas of the well drained Billett, excessively drained Menahga, and moderately well drained Scott Lake soils. Billett and Scott Lake soils are in positions on the landscape similar to those of the Moundville soil. Billett soils have more clay in the surface layer and in the upper part of the subsoil than the Moundville soil. Scott Lake soils have more clay in the surface layer and subsoil than the Moundville soil and have a substratum of sand and gravel. Menhaga soils have a subsoil and substratum of sand. They are in the slightly higher positions on the landscape. Included soils make up 2 to 10 percent of the unit.

Permeability is rapid in the Moundville soil. The available water capacity is low. Natural fertility also is low. The organic matter content is low or moderately low in the surface layer. This layer is very friable and can be easily tilled throughout a wide range of moisture content. The rooting depth of most crops is limited by droughtiness. The depth to the seasonal high water table ranges from 2.0 to 3.5 feet.

Most areas are used as cropland. This soil is poorly suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If irrigated, however, it is suited to the commonly grown farm crops and to vegetables, such as snap beans, potatoes, sweet corn, and peas. In most years crop yields are limited by the low available water capacity. If cultivated crops are grown, the soil is subject to soil blowing. Winter cover crops, conservation tillage, wind stripcropping, and field windbreaks help to prevent excessive soil loss. Returning crop residue to the soil or adding other organic material reduces the hazard of soil blowing and the amount of water lost through evaporation, increases the rate of water infiltration, and helps to maintain fertility.

A cover of pasture plants is effective in controlling soil blowing. Forage yields are generally low unless fertilizer is applied and the supply of moisture is adequate. Planting early in spring, before the soil has a chance to dry out, helps to overcome the droughtiness. Planting later in the year is likely to result in a poor survival rate. Overgrazing can cause surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Measures that improve fertility, proper stocking rates, and pasture rotation help to keep the pasture in good condition.

This soil is suited to trees. Seedling mortality is a management concern. Seedling survival can be improved by careful planting of vigorous nursery stock. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

This soil readily absorbs the effluent in septic tank absorption fields. It does not adequately filter the effluent, however, because of the rapid permeability in the substratum. The poor filtering capacity can result in the pollution of ground water. The wetness also is a limitation. Mounding the site with suitable filtering material helps to overcome the wetness and the poor filtering capacity. Also, the effluent can be pumped to an absorption field on a better suited soil in some nearby areas.

Because of the wetness, this soil is only moderately suited to dwellings without basements and is poorly suited to dwellings with basements. This limitation can be overcome by installing tile drains around the foundations and providing gravity outlets or other dependable outlets and by constructing the foundations on coarse textured fill material above the level of wetness.

Because of the wetness, this soil is only moderately suited to local roads and streets. This limitation can be overcome by installing a subsurface drainage system.

The land capability classification is IVs. The woodland ordination symbol is 6S.

Na—Newson loamy sand, 0 to 2 percent slopes. This deep, nearly level, poorly drained and very poorly drained soil is in drainageways on outwash plains and low stream terraces. It is subject to ponding and rare flooding. Individual areas are irregularly shaped or elongated and generally range from 5 to 50 acres in size.

Typically, the surface layer is black loamy sand about 9 inches thick. The subsurface layer is very dark gray sand about 5 inches thick. The subsoil is loose sand about 30 inches thick. It is grayish brown in the upper part and pale brown and mottled in the lower part. The substratum to a depth of about 60 inches is light brownish gray and pale brown sand. In places the surface layer is sand, mucky loamy sand, or muck.

Included with this soil in mapping are small areas of the poorly drained and very poorly drained Fordum, very poorly drained Markey, and somewhat poorly drained Meehan soils. Fordum soils have a loamy mantle. They are on flood plains. Markey soils formed in organic material in depressions. Meehan soils are in the slightly higher positions on the landscape. Included soils make up 5 to 15 percent of the unit.

Permeability is rapid in the Newson soil. The available water capacity is low. Natural fertility also is low. The organic matter content is high or very high in the surface layer. The rooting depth of most plants is limited by a seasonal high water table, which is near or above the surface in undrained areas.

Most areas of this soil are wooded or support wetland vegetation. Some are used as pasture. Undrained areas are generally not suited to cultivated crops because of the wetness. Drained areas are suited to the commonly grown farm crops and to certain vegetables. Unless the soil is irrigated, crop yields usually are limited by the low available water capacity. The number of frost-free days per growing season is limited. Planting early maturing crop varieties or growing corn for silage helps overcome the frost hazard. If drained and cultivated, the soil is subject to soil blowing.

This soil is poorly suited to pasture unless it is drained. Establishing an improved pasture is difficult because of the wetness. Grazing is limited to the short periods when the soil is dry. The native vegetation is generally of poor quality for forage.

This soil is poorly suited to trees. The trees grow so poorly and are so poorly shaped that they are barely merchantable at best. The equipment limitation, seedling mortality, and the windthrow hazard are management concerns. Because of the wetness, hand planting or machine planting on prepared ridges generally is needed if natural regeneration is unreliable. Selection of vigorous nursery stock for planting reduces the seedling mortality rate. Harvesting is frequently limited to periods when the ground is frozen. Harvesting by clearcut or area-selection methods helps to prevent windthrow of the remaining trees. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation.

This soil generally is not suitable as a site for septic tank absorption fields, dwellings, or local roads and streets, mainly because of the flooding and the ponding. Overcoming these hazards is difficult. A better suited site should be considered.

The land capability classification is VIw in undrained areas. The woodland ordination symbol is 6W.

NtB—Northfield silt loam, 2 to 6 percent slopes. This shallow, gently sloping, well drained soil is on the tops of ridges in the uplands. Individual areas are irregular in shape and generally range from 5 to 60 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 9 inches thick. The subsoil is about 10 inches thick. It is dark yellowish brown, friable silt loam in the upper part and yellowish brown, very friable loamy sand in the lower part. Platy sandstone is at a depth of about 19 inches.

Included with this soil in mapping are small areas of the well drained Gale soils. These soils are in positions on the landscape similar to those of the Northfield soil. They are moderately deep over sandstone. They make up 2 to 8 percent of the unit.

Permeability is moderate in the Northfield soil. The available water capacity is low. The organic matter content is moderately low in the surface layer. This layer is friable and can be easily tilled, but it tends to crust or puddle after hard rains or if it is tilled when too wet. The rooting depth of most crops is limited by droughtiness in the sandy part of the subsoil or by the underlying sandstone.

Most areas are used as cropland. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. In most years crop yields are limited by the low available water capacity. If cultivated crops are grown, water erosion is a slight or moderate hazard. It can be controlled by contour farming, contour stripcropping, conservation tillage, and grassed waterways. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazard of erosion.

A cover of pasture plants is effective in controlling erosion. The surface layer is subject to crusting, which restricts the emergence of the plants. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, measures that improve fertility, and restricted use during wet periods help to keep the pasture in good condition.

This soil is suited to trees. Seedling mortality and the windthrow hazard are management concerns. Carefully planting vigorous nursery stock improves the survival rate of trees planted during dry periods. Harvesting by clearcut or area-selection methods helps to prevent windthrow of the remaining trees. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

Because of the shallow depth to bedrock, this soil generally is not suited to septic tank absorption fields, is only moderately suited to dwellings without basements, and is poorly suited to dwellings with basements. On sites for dwellings, this limitation can be overcome by ripping and excavating the bedrock with suitable power equipment; by adding fill material, which raises the site; or by constructing the dwellings with only partially exposed basements.

Because of the depth to bedrock, this soil is only moderately suited to local roads and streets. The bedrock can be removed by blasting or by suitable power equipment.

The land capability classification is IIIe. The woodland ordination symbol is 3D.

NtC2—Northfield silt loam, 6 to 12 percent slopes, eroded. This shallow, sloping, well drained soil is on side slopes and the tops of ridges in the uplands. Individual areas are irregular in shape and generally range from 10 to 60 acres in size.

In most cultivated areas on the crest of hills and the upper side slopes, erosion has removed most of the original surface layer. Typically, the remaining surface layer is dark grayish brown silt loam about 8 inches thick. The subsurface layer is brown, friable silt loam about 2 inches thick. The subsoil is dark brown, friable silt loam about 8 inches thick. Platy sandstone is at a depth of about 18 inches. In places sandstone channers are on the surface. In some areas the slope is less than 6 or more than 12 percent.

Included with this soil in mapping are small areas of the well drained and somewhat excessively drained Eleva and well drained Gale soils. These soils are in positions on the landscape similar to those of the Northfield soil. They are moderately deep over sandstone. They make up 2 to 10 percent of the unit.

Permeability is moderate in the Northfield soil. The available water capacity is low. The organic matter content is moderately low in the surface layer. This layer is friable, but it tends to crust and puddle after hard rains or if it is tilled when too wet. The rooting depth of most crops is limited by the underlying sandstone.

Most areas are used as cropland or pasture. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. In most years crop yields are limited by the low available water capacity. If cultivated crops are grown, water erosion is a moderate hazard. It can be controlled by contour farming, contour stripcropping, and conservation tillage. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazard of erosion.

A cover of pasture plants is effective in controlling erosion. The surface layer is subject to crusting, which restricts the emergence of the plants. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, measures that improve fertility, and restricted use during wet periods help to keep the pasture in good condition.

This soil is suited to trees. Seedling mortality and the windthrow hazard are management concerns. Carefully planting vigorous nursery stock improves the survival rate of trees planted during dry periods. Harvesting by clearcut or area-selection methods helps to prevent windthrow of the remaining trees. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

Because of the shallow depth to bedrock, this soil generally is not suited to septic tank absorption fields, is only moderately suited to dwellings without basements, and is poorly suited to dwellings with basements. The slope also is a limitation on sites for dwellings. It can be overcome by cutting and filling, by installing retaining walls, or by designing the dwellings so that one side of the basement fronts on the lower part of the slope. Also, the dwellings can be constructed in the included areas where the slope is less than 6 percent. The depth to bedrock can be overcome by ripping and excavating the bedrock with suitable power equipment; by adding fill material, which raises the site; or by constructing the dwellings with only partially exposed basements.

Because of the depth to bedrock and the slope, this soil is only moderately suited to local roads and streets. The bedrock can be removed by blasting or by suitable power equipment. The slope can be overcome by shaping the roadway through cutting and filling. Also, the road can be built in the less sloping areas.

The land capability classification is IVe. The woodland ordination symbol is 3D.

NtD2—**Northfield silt loam, 12 to 20 percent slopes, eroded.** This shallow, moderately steep, well drained soil is on side slopes in the uplands. Individual areas are elongated and generally range from 5 to 75 acres in size.

In most cultivated areas on the crest of hills and the upper side slopes, erosion has removed most of the original surface layer. Typically, the remaining surface layer is dark brown silt loam about 8 inches thick. The subsoil is about 7 inches thick. It is dark brown, friable silt loam in the upper part and yellowish brown, very friable loamy sand in the lower part. Platy sandstone is at a depth of about 15 inches. In places the content of sandstone channers in the surface layer is as much as 5 percent. In some areas the slope is less than 12 or more than 20 percent.

Included with this soil in mapping are small areas of the somewhat excessively drained and well drained Eleva soils. These soils are in positions on the landscape similar to those of the Northfield soil. They are moderately deep over sandstone. They make up 5 to 10 percent of the unit.

Permeability is moderate in the Northfield soil. The available water capacity is low. The organic matter content is moderately low in the surface layer. The rooting depth of most crops is limited by droughtiness in the sandy part of the subsoil or by the underlying sandstone.

Most areas are used as pasture. A few are wooded. Because of a very severe hazard of water erosion, this soil is not suited to cultivated crops. A cover of pasture plants is effective in controlling erosion. The surface layer is subject to crusting, which restricts the emergence of the plants. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, pasture rotation, measures that improve fertility, and restricted use during wet periods help to keep the pasture in good condition.

This soil is suited to trees. The erosion hazard, the equipment limitation, seedling mortality and the windthrow hazard are management concerns. Erosion can be controlled by planting the trees on on the contour and by carefully locating skid roads during harvest. Carefully planting vigorous nursery stock reduces the seedling mortality rate. Harvesting by clearcut or area-selection methods helps to prevent windthrow of the remaining trees. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

Because of the shallow depth to bedrock and the slope, this soil generally is not suited to septic tank absorption fields. It is poorly suited to dwellings because of the slope. This limitation can be overcome by cutting and filling or by installing retaining walls. Also, the dwellings can be designed so that one side of the basement fronts on the lower part of the slope. The depth to bedrock is a limitation on sites for dwellings with basements. It can be overcome by ripping and excavating the bedrock with suitable power equipment; by adding fill material, which raises the site; or by constructing the dwellings with only partially exposed basements.

Because of the slope, this soil is poorly suited to local roads and streets. This limitation can be overcome by shaping the roadway through cutting and filling. Also, the road can be built in the less sloping areas.

The land capability classification is VIe. The woodland ordination symbol is 3R.

Oe—Oesterle sandy loam, 0 to 2 percent slopes. This deep, nearly level, somewhat poorly drained soil is in drainageways on stream terraces and outwash plains. Individual areas are irregular in shape and generally range from 5 to 40 acres in size.

Typically, the surface layer is very dark brown sandy loam about 7 inches thick. The subsurface layer is mostly dark grayish brown sandy loam about 10 inches thick. The subsoil is about 17 inches thick. It is mottled. It is dark brown, friable sandy loam in the upper part and dark yellowish brown, very friable gravelly loamy sand in the lower part. The substratum to a depth of about 60 inches is yellowish brown sand and gravel. In places it is sand.

Included with this soil in mapping are small areas of the moderately well drained Scott Lake soils. These soils are in the slightly higher positions on the landscape. They make up 5 to 10 percent of the unit.

Permeability is moderate in the upper part of the subsoil in the Oesterle soil and rapid or very rapid in the substratum. The available water capacity is low. The organic matter content is moderate in the surface layer. This layer is friable and can be easily tilled throughout a wide range of moisture content. The rooting depth of most crops is limited by a seasonal high water table, which is at a depth of 1 to 3 feet in undrained areas.

Most areas are wooded. A few are used as cropland or pasture. If drained, this soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Excess water can be removed by diversions, grassed waterways, surface drains, and interceptor subsurface drains. If tile drains are installed, the finer sand enters the tile lines unless a suitable filter covers the tile. If the soil is drained and cultivated, soil blowing is a hazard. It can be controlled by wind stripcropping, field windbreaks, and conservation tillage. Returning crop residue to the soil or adding other organic material reduces the hazard of soil blowing and the amount of water lost through evaporation, increases the rate of water infiltration, and helps to maintain fertility.

A cover of pasture plants is effective in controlling soil blowing. Alfalfa is short lived unless the soil is drained. Red clover is generally grown. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is suited to trees. The equipment limitation and the windthrow hazard are management concerns. Because of the wetness, hand planting or machine planting on prepared ridges generally is needed if natural regeneration is unreliable. Selection of vigorous nursery stock for planting reduces the seedling mortality rate. Harvesting is frequently limited to periods when the ground is frozen. Harvesting by clearcut or area-selection methods helps to prevent windthrow of the remaining trees. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

This soil readily absorbs the effluent in septic tank absorption fields. It does not adequately filter the effluent, however, because of the rapid permeability. The poor filtering capacity can result in the pollution of ground water. The wetness also is a limitation. Mounding the site with suitable filtering material helps to overcome the wetness and the poor filtering capacity. Also, the effluent can be pumped to an absorption field on a better suited soil in some nearby areas.

Because of the wetness, this soil is poorly suited to dwellings. This limitation can be overcome by installing tile drains around foundations and providing gravity outlets or other dependable outlets and by constructing the foundations on coarse textured fill material above the level of wetness.

Because of the potential for frost action, this soil is poorly suited to local roads and streets. Replacing the upper part of the soil with coarse textured base material, such as sand or gravel, helps to prevent the damage caused by frost action.

The land capability classification is IIw. The woodland ordination symbol is 3W.

Or—Orion silt loam, 0 to 2 percent slopes. This deep, nearly level, somewhat poorly drained soil is in plane and slightly convex areas on flood plains. It is frequently flooded for brief periods. Individual areas are elongated and generally range from 5 to 60 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 7 inches thick. The upper substratum is brown and dark grayish brown, mottled silt loam about 25 inches thick. The next 11 inches is a buried surface layer of black, mottled silt loam. The lower substratum to a depth of about 60 inches is dark gray and grayish brown, mottled silt loam. In places the surface layer is sandy loam or loam.

Included with this soil in mapping are small areas of the moderately well drained Arenzville soils. These soils are in the slightly higher positions on the flood plains. Also included are small areas of poorly drained soils in depressions. Included soils make up 2 to 10 percent of the unit.

Permeability is moderate in the Orion soil. The available water capacity is high. The organic matter content is moderately low or moderate in the surface layer. This layer is friable and can be easily tilled, but it tends to crust and puddle after hard rains or if it is tilled when too wet. The rooting depth of most crops is limited by a seasonal high water table, which is at a depth of 1 to 3 feet in undrained areas.

Most areas are used as pasture. A few are used as cropland. If drained and protected from flooding, this soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Dikes and diversions help to prevent flooding. Land smoothing, diversions, and interceptor subsurface drains help to remove excess water. Restrictive soil layers may limit the movement of water into tile drains. If drainage tile is installed, silt and fine sand enter the tile lines unless a suitable filter is used to cover the tile. Applying a system of conservation tillage and returning crop residue to the soil or adding other organic material help to maintain fertility and good tilth and increase the rate of water infiltration.

This soil is suited to pasture. The surface layer is subject to crusting, which restricts the emergence of the plants. Alfalfa is generally short lived because of the seasonal high water table, the flooding, and the winterkill caused by frost heave. Red clover is generally grown. Overgrazing or grazing when the soil is wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, measures that improve fertility, pasture rotation, and timely deferment of grazing help to keep the pasture in good condition.

This soil is suited to trees. The equipment limitation is a management concern. Because of the wetness, hand planting or machine planting on prepared ridges is needed if natural regeneration is unreliable. Planting vigorous nursery stock reduces the seedling mortality rate. Harvesting is frequently limited to periods when the ground is frozen. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

This soil generally is not suitable as a site for septic tank absorption fields, dwellings, or local roads and streets, mainly because of the flooding and the wetness. Overcoming these limitations is difficult. A better suited site should be considered.

The land capability classification is IIIw. The woodland ordination symbol is 2W.

OsC2—Otterholt silt loam, 6 to 12 percent slopes, eroded. This deep, sloping, well drained soil is on side slopes on ground moraines. Individual areas are irregular in shape and generally range from 5 to 60 acres in size.

In most cultivated areas on the crest of hills and the upper side slopes, erosion has removed most of the original surface layer. Typically, the remaining surface layer is dark grayish brown silt loam about 8 inches thick. The subsurface layer is mostly grayish brown silt loam about 8 inches thick. The subsoil is friable silt loam about 20 inches thick. It is mostly dark yellowish brown in the upper part and is yellowish brown in the lower part. The upper 7 inches of the substratum is yellowish brown silt loam. The lower part to a depth of about 60 inches is reddish brown sandy loam. In places cobbles are on the surface. In some areas the slope is less than 6 or more than 12 percent.

Included with this soil in mapping are small areas of the moderately well drained Spencer soils. These soils are in the slightly lower positions on the landscape. They make up 5 to 10 percent of the unit.

Permeability is moderate in the upper part of the Otterholt soil and moderately slow in the lower part of the substratum. The available water capacity is high. The organic matter content is moderate in the surface layer. This layer is friable and can be easily tilled, but it tends to crust and puddle after hard rains or if it is tilled when too wet.

Most areas are used as cropland. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, water erosion is a moderate hazard. It can be controlled by contour farming, contour stripcropping, grassed waterways and conservation tillage. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazard of erosion.

A cover of pasture plants is effective in controlling erosion. The surface layer is subject to crusting, which restricts the emergence of the plants. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, measures that improve fertility, and restricted use during wet periods help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

Because of the moderately slow permeability in the substratum, this soil is poorly suited to septic tank absorption fields. This limitation can be overcome by constructing a mound of suitable filtering material and possibly by increasing the size of the absorption field.

Because of the shrink-swell potential and the slope, this soil is only moderately suited to dwellings. The shrink-swell potential can be overcome by excavating the soil and replacing it with coarse textured material, such as sand or gravel; by strengthening the basement walls; and by installing a subsurface drainage system at or below the basement elevation. The slope can be overcome by cutting and filling, by installing retaining walls, or by designing the dwellings so that one side of the basement fronts on the lower part of the slope. Also, the dwellings can be constructed in the included areas where the slope is less than 6 percent.

Because of low strength and the potential for frost action, this soil is poorly suited to local roads and streets. Low strength can be overcome by replacing the upper part of the soil with coarse textured base material, such as sand or gravel, and by increasing the thickness of the pavement or base material. Installing a subsurface drainage system and replacing the upper part of the soil with coarse textured base material help to prevent the damage caused by frost action.

The land capability classification is IIIe. The woodland ordination symbol is 5A.

Pc—Pits, gravel. This map unit consists of open excavations from which sand and gravel and, in a few places, glacial till have been removed to a depth of at least several feet. Individual areas are irregular in shape and generally range from 3 to 30 acres in size.

Typically, the material on the bottom and sides of these pits is stratified sand and gravel. It is droughty. Other soil properties vary.

Included in this unit in mapping are piles of soil material that was removed from the pit area before the excavation was made and, within the pit area, piles of material that was discarded because it did not contain enough gravel. Also included are areas of stones and boulders that are too large to be crushed. Included areas make up less than 5 percent of the unit.

Many pits are still mined. Some have been abandoned and are covered with brush and weeds. Other abandoned pits contain water.

The main management concern is reclamation of the pits after excavation. In most of the pits, land shaping and additions of suitable topsoil are needed before a plant cover can be established. The suitability of these pits for septic tank absorption fields, dwellings, and local roads and streets should be determined by onsite investigation.

This unit is not assigned a land capability classification or a woodland ordination symbol.

PdB—Plainbo loamy sand, 2 to 6 percent slopes. This moderately deep, gently sloping, excessively drained soil is in slightly convex areas on outwash plains, stream terraces, and foot slopes in the uplands. Individual areas are irregular in shape and generally range from 3 to 30 acres in size.

Typically, the surface layer is dark grayish brown loamy sand about 8 inches thick. The subsoil is yellowish brown and dark yellowish brown, very friable sand about 15 inches thick. The substratum is yellow sand about 15 inches thick. Poorly cemented sandstone is at a depth of about 38 inches. In places the surface layer is sand.

Included with this soil in mapping are small areas of the excessively drained Menahga soils. These soils are in positions on the landscape similar to those of the Plainbo soil. They are sandy throughout. They make up 5 to 15 percent of the unit.

Permeability is rapid in the Plainbo soil. The available water capacity is very low. Natural fertility is low. The organic matter content is very low or low in the surface layer. This layer is very friable and can be easily tilled throughout a wide range of moisture content. The rooting depth of most crops is limited by droughtiness or by the underlying sandstone.

Most areas are used as cropland. A few have been planted to pine. This soil is poorly suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. In most years crop yields are limited by the very low available water capacity. If cultivated crops are grown, water erosion is a slight hazard. Also, the soil is subject to soil blowing. Winter cover crops, conservation tillage, wind stripcropping, and field windbreaks help to prevent excessive soil loss. Returning crop residue to the soil or adding other organic material reduces the hazards of erosion and soil blowing and the amount of water lost through evaporation, increases the rate of water infiltration, and helps to maintain fertility.

A cover of pasture plants is effective in controlling soil blowing and erosion. Forage yields are generally low unless fertilizer is applied and the supply of moisture is adequate. Planting early in spring, before the soil has a chance to dry out, helps to overcome the droughtiness. Planting later in the year is likely to result in a poor survival rate. Overgrazing can cause surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Measures that improve fertility, proper stocking rates, and pasture rotation help to keep the pasture in good condition.

This soil is suited to trees. The equipment limitation and seedling mortality are management concerns. Because of the loose sand, equipment with flotation tires or tracks can be operated more easily than other equipment. Seedling survival can be improved by careful planting of vigorous nursery stock. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

Because of the depth to bedrock and the rapid permeability, this soil is poorly suited to septic tank absorption fields. It readily absorbs but does not adequately filter the effluent. The poor filtering capacity can result in the pollution of ground water. The absorption field functions adequately if the site is mounded with suitable filtering material.

This soil is suited to local roads and streets and to dwellings without basements. It is only moderately suited to dwellings with basements because of the depth to bedrock. This limitation can be overcome by ripping and excavating the bedrock with suitable power equipment;

by adding fill material, which raises the site; or by constructing the dwellings with only partially exposed basements.

The land capability classification is IVs. The woodland ordination symbol is 5S.

PdC—**Plainbo loamy sand, 6 to 12 percent slopes.** This moderately deep, sloping, excessively drained soil is on foot slopes and side slopes in the uplands. Individual areas are irregular in shape and generally range from 5 to 30 acres in size.

Typically, the surface layer is very dark grayish brown loamy sand about 9 inches thick. The subsoil is about 21 inches thick. It is brown, very friable loamy sand in the upper part and brown and yellowish brown, loose sand in the lower part. Poorly cemented sandstone is at a depth of about 30 inches. In places the surface layer is sand. In some areas the slope is less than 6 or more than 12 percent.

Included with this soil in mapping are small areas of the well drained Elkmound and excessively drained Menahga soils. Elkmound soils formed in loamy deposits that are shallow over sandstone. They are in the higher positions on the landscape. Menahga soils are sandy throughout. They are in the lower positions on the landscape. Included soils make up 5 to 15 percent of the unit.

Permeability is rapid in the Plainbo soil. The available water capacity is very low. Natural fertility is low. The organic matter content is very low or low in the surface layer. This layer is very friable and can be easily tilled throughout a wide range of moisture content. The rooting depth of most crops is limited by droughtiness or by the underlying sandstone.

Most areas are used as pasture or woodland. This soil is not suited to cultivated crops because of the hazards of drought, water erosion, and soil blowing. A cover of pasture plants is effective in controlling soil blowing and erosion. Forage yields are generally low unless fertilizer is applied and the supply of moisture is adequate. Planting early in spring, before the soil has a chance to dry out, helps to overcome the droughtiness. Planting later in the year is likely to result in a poor survival rate. Overgrazing can cause surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Measures that improve fertility, proper stocking rates, and pasture rotation help to keep the pasture in good condition.

This soil is suited to trees. The equipment limitation and seedling mortality are management concerns. Because of the loose sand, equipment with flotation tires or tracks can be operated more easily than other equipment. Seedling survival can be improved by careful planting of vigorous nursery stock. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

Because of the depth to bedrock and the rapid permeability, this soil is poorly suited to septic tank absorption fields. The poor filtering capacity can result in the pollution of ground water. The absorption field functions adequately if the site is mounded with suitable filtering material.

Because of the slope, this soil is only moderately suited to dwellings. This limitation can be overcome by cutting and filling, by installing retaining walls, or by designing the dwellings so that one side of the basement fronts on the lower part of the slope. Also, the dwellings can be constructed in the included areas where the slope is less than 6 percent. The depth to bedrock is a limitation on sites for dwellings with basements. It can be overcome by ripping and excavating the bedrock with suitable power equipment; by adding fill material, which raises the site; or by constructing the dwellings with only partially exposed basements.

Because of the slope, this soil is only moderately suited to local roads and streets. This limitation can be overcome by shaping the roadway through cutting and filling. Also, the road can be built in the less sloping areas.

The land capability classification is VIs. The woodland ordination symbol is 5S.

PdD—Plainbo loamy sand, 12 to 20 percent slopes. This moderately deep, moderately steep, excessively drained soil is on side slopes in the uplands. Individual areas are irregularly shaped or elongated and generally range from 5 to 160 acres in size.

Typically, the surface layer is dark grayish brown loamy sand about 6 inches thick. The subsoil is yellowish brown, very friable and loose sand about 14 inches thick. The substratum is brownish yellow channery sand about 8 inches thick. Poorly cemented sandstone is at a depth of about 28 inches. In places the surface layer is sand.

Included with this soil in mapping are small areas of the well drained Elkmound soils. These soils formed in loamy deposits that are shallow over sandstone. They are in the higher positions on the landscape. They make up 5 to 15 percent of the unit.

Permeability is rapid in the Plainbo soil. The available water capacity is very low. Natural fertility is low. The organic matter content is very low or low in the surface layer. The rooting depth of most crops is limited by droughtiness or by the underlying sandstone.

Most areas are used as pasture or woodland. Some have been planted to pine. Because of the hazards of drought, erosion, and soil blowing, this soil is not suited to cultivated crops. It is poorly suited to pasture. Forage yields are generally low because of the very low available water capacity. A cover of pasture plants is effective in controlling erosion and soil blowing. Overgrazing can cause surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, pasture rotation, measures that improve fertility, and timely deferment of grazing help to keep the pasture in good condition.

This soil is suited to trees. The erosion hazard, the equipment limitation, and seedling mortality are management concerns. Planting on the contour and carefully locating skid roads during harvest minimize erosion. Seedling survival on the steeper slopes facing south or west can be improved by careful planting of vigorous nursery stock. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

Because of the depth to bedrock, the slope, and the rapid permeability, this soil is poorly suited to septic tank absorption fields. It readily absorbs but does not adequately filter the effluent. The poor filtering capacity can result in the pollution of ground water. Mounding the site with suitable filtering material helps to overcome the poor filtering capacity and the depth to bedrock. The slope can be overcome by cutting and filling or by installing a trench absorption system on the contour.

Because of the slope, this soil is poorly suited to dwellings. This limitation can be overcome by cutting and filling or by installing retaining walls. Also, the dwelling can be designed so that one side of the basement fronts on the lower part of the slope.

Because of the slope, this soil is poorly suited to local roads and streets. This limitation can be overcome by shaping the roadway through cutting and filling. Also, the road can be built in the less sloping areas.

The land capability classification is VIIs. The woodland ordination symbol is 5R.

Pv—Plover silt loam, 0 to 2 percent slopes. This deep, nearly level, somewhat poorly drained soil is in shallow depressions and drainageways on glacial lake plains. Individual areas are irregular in shape and generally range from 5 to 60 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 8 inches thick. The subsurface layer is mostly brown, mottled silt loam about 12 inches thick. The subsoil is about 18 inches thick. It is mostly reddish brown, is mottled, and is friable. The upper part is very fine sandy loam, the next part is silt loam, and the lower part is very fine sandy loam. The substratum to a depth of about 60 inches is dark brown, stratified fine sand, very fine sand, and silt. In places the surface layer is fine sandy loam.

Included with this soil in mapping are small areas of the moderately well drained Alban and poorly drained Rib soils. Alban soils have a surface layer of fine sandy loam. They are in the slightly higher positions on the landscape. Rib soils are underlain by stratified sand and gravel. They are in the lower positions on the landscape. Included soils make up 5 to 10 percent of the unit.

Permeability is moderate in the Plover soil. The available water capacity is high. The organic matter content is moderate in the surface layer. This layer is friable and can be easily tilled, but it tends to crust and puddle after hard rains or if it is tilled when too wet. The rooting depth of most crops is limited by a seasonal high water table, which is at a depth of 1 to 3 feet in undrained areas.

Most areas are used as cropland. A few are used as pasture. If drained, this soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Excess water can be removed by diversions, land smoothing, grassed waterways, surface drains, and interceptor subsurface drains. If tile drains are installed, silt and the finer sand enters the tile lines unless a suitable filter covers the tile. Applying a system of conservation tillage and returning crop residue to the soil or adding other organic material reduce the amount of water lost through evaporation, increase the rate of water infiltration, and help to maintain fertility.

This soil is suited to pasture. The surface layer is subject to crusting, which restricts the emergence of small-seeded crops. Alfalfa is generally short lived because of the seasonal high water table and the winterkill caused by frost heave. Red clover is generally grown. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, pasture rotation, measures that improve fertility, and timely deferment of grazing help to keep the pasture in good condition.

This soil is suited to trees. The equipment limitation and the windthrow hazard are management concerns. Because of the wetness, hand planting or machine planting on prepared ridges generally is needed if natural regeneration is unreliable. Selection of vigorous nursery stock for planting reduces the seedling mortality rate. Harvesting is frequently limited to periods when the ground is frozen. Harvesting by clearcut or area-selection methods helps to prevent windthrow of the remaining trees. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

Because of the wetness, this soil is poorly suited to septic tank absorption fields. Mounding the site with suitable filtering material helps to overcome this limitation. Also, the effluent can be pumped to an absorption field on a better suited soil in some nearby areas.

Because of the wetness, this soil is poorly suited to dwellings. This limitation can be overcome by constructing foundations on coarse textured fill material above the level of wetness and by installing tile drains around the foundations and providing gravity outlets or other dependable outlets.

Because of the potential for frost action, this soil is poorly suited to local roads and streets. Replacing the upper part of the soil with coarse textured base material, such as sand or gravel, helps to prevent the damage caused by frost action.

The land capability classification is IIw. The woodland ordination symbol is 3W.

Px—Poskin silt loam, 0 to 2 percent slopes. This deep, nearly level, somewhat poorly drained soil is in shallow depressions and drainageways on outwash plains and stream terraces. Individual areas are irregular in shape and generally range from 10 to 80 acres in size.

Typically, the surface layer is dark brown silt loam about 10 inches thick. The subsurface layer is about 9 inches of mostly brown silt and silt loam. It is mottled in the lower part. The subsoil is about 19 inches thick. It is mottled and friable. It is mostly dark yellowish brown silt loam in the upper part and dark brown sandy loam in the lower part. The substratum to a depth of about 60 inches is dark brown sand and gravel.

Included with this soil in mapping are small areas of the moderately well drained Brill and poorly drained Rib soils. Brill soils are in the slightly higher positions on the landscape. Rib soils are in the lower positions. Included soils make up 5 to 10 percent of the unit.

Permeability is moderate in the upper part of the Poskin soil and rapid or very rapid in the substratum. The available water capacity is moderate. The organic matter content is moderately low or moderate in the surface layer. This layer is friable and can be easily tilled, but it tends to crust and puddle after hard rains or if it is tilled when too wet. The rooting depth of most crops is limited by a seasonal high water table, which is at a depth of 1 to 3 feet in undrained areas.

Most areas are used as cropland. A few are used as pasture. If drained, this soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Excess water can be removed by diversions, grassed waterways, surface drains, and interceptor subsurface drains. If tile drains are installed, the finer sand enters the tile lines unless a suitable filter covers the tile. Applying a system of conservation tillage and returning crop residue to the soil or adding other organic material reduce the amount of water lost through evaporation, increase the rate of water infiltration, and help to maintain fertility.

This soil is suited to pasture. The surface layer is subject to crusting, which restricts the emergence of small-seeded crops. Alfalfa is generally short lived because of the seasonal high water table and the winterkill caused by frost heave. Red clover is generally grown. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, measures that improve fertility, and restricted use during wet periods help to keep the pasture in good condition.

This soil is suited to trees. The equipment limitation and the windthrow hazard are management concerns. Because of the wetness, hand planting or machine planting on prepared ridges generally is needed if natural regeneration is unreliable. Selection of vigorous nursery stock for planting reduces the seedling mortality rate. Harvesting is frequently limited to periods when the ground is frozen. Harvesting by clearcut or area-selection methods helps to prevent windthrow of the remaining trees. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

This soil readily absorbs the effluent in septic tank absorption fields. It does not adequately filter the effluent, however, because of the rapid permeability. The poor filtering capacity can result in the pollution of ground water. The wetness also is a limitation. Mounding the site with suitable filtering material helps to overcome the wetness and the poor filtering capacity. Also, the effluent can be pumped to an absorption field on a better suited soil in some nearby areas.

Because of the wetness, this soil is poorly suited to dwellings. This limitation can be overcome by installing tile drains around foundations and providing gravity outlets or other dependable outlets and by constructing the foundations on coarse textured fill material above the level of wetness.

Because of low strength and the potential for frost action, this soil is poorly suited to local roads and streets. Low strength can be overcome by replacing the upper part of the soil with coarse textured base material, such as sand or gravel, and by increasing the thickness of the pavement or base material. Installing a subsurface drainage system and replacing the upper part of the soil with coarse textured base material help to prevent the damage caused by frost action.

The land capability classification is IIw. The woodland ordination symbol is 3W.

Rb—Rib silt loam, 0 to 2 percent slopes. This deep, nearly level, poorly drained soil is in drainageways on outwash plains and stream terraces. It is subject to ponding and is occasionally flooded for brief periods. Individual areas are oblong and generally range from 5 to 50 acres in size.

Typically, the surface layer is black silt loam about 8 inches thick. The subsoil is about 25 inches thick. It is gray, mottled, and friable. It is silt loam in the upper part and loam in the lower part. The substratum to a depth of about 60 inches is yellowish brown, stratified sand and gravel. In places it has loamy strata.

Included with this soil in mapping are small areas of the somewhat poorly drained Halder and Poskin soils. Halder soils formed in loamy deposits. Both of the included soils are in the slightly higher positions on the landscape. They make up 5 to 10 percent of the unit.

Permeability is moderate in the subsoil of the Rib soil and very rapid in the substratum. The available water capacity is moderate. The organic matter content is moderate to very high in the surface layer. This layer is friable, but it tends to crust and puddle after hard rains or if it is tilled when too wet. The rooting depth of most crops is limited by a seasonal high water table, which is near or above the surface in undrained areas.

Most areas are used as cropland. A few are used as pasture or woodland. If drained, this soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Dikes and diversions help to prevent flooding. Excess water can be removed by grassed waterways, land smoothing, surface drains, and interceptor subsurface drains. If tile drains are installed, the finer sand enters the tile lines unless a suitable filter covers the tile. Applying a system of conservation tillage and returning crop residue to the soil or adding other organic material reduce the amount of water lost through evaporation, increase the rate of water infiltration, and help to maintain fertility.

This soil is suited to pasture. The surface layer is subject to crusting, which restricts the emergence of small-seeded crops. Alfalfa is subject to the winterkill caused by frost heave. It is short lived unless the soil is adequately drained and protected from ponding and flooding. Red clover is generally grown. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, pasture rotation, measures that improve fertility, and restricted use during wet periods help to keep the pasture in good condition.

This soil is suited to trees. The equipment limitation, seedling mortality, and the windthrow hazard are management concerns. Because of the wetness, hand planting or machine planting on prepared ridges is generally needed if natural regeneration is unreliable. Selection of vigorous nursery stock for planting reduces the seedling mortality rate. Harvesting is frequently limited to periods when the ground is frozen. Harvesting by clearcut or area-selection methods helps to prevent windthrow of the remaining trees. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

This soil generally is not suitable as a site for septic tank absorption fields, dwellings, or local roads and streets, mainly because of the flooding and the ponding. Overcoming these hazards is difficult. A better suited site should be considered.

The land capability classification is IIw in drained areas. The woodland ordination symbol is 2W.

Rc—Rib mucky silt loam, ponded, 0 to 2 percent slopes. This deep, nearly level, poorly drained soil is in depressions and drainageways on outwash plains and stream terraces. It is subject to ponding and is occasionally flooded. The flooding and ponding last for long periods. Individual areas are irregularly shaped or elongated and generally range from 5 to 30 acres in size.

Typically, the surface layer is black mucky silt loam about 15 inches thick. The subsoil is friable silt loam about 25 inches thick. The upper part is gray and dark gray and is mottled, and the lower part is greenish gray. The substratum to a depth of about 60 inches is dark gray, stratified sand and gravel. In places the surface layer is not mucky. In some areas the silty deposits are more than 40 inches thick.

Included with this soil in mapping are small areas of the very poorly drained Markey soils and small areas of the Rib soils that are not ponded for long periods. Markey soils formed in organic material in depressions on the lower parts of the landscape. The included Rib soils have a surface layer of silt loam. They are in the slightly higher positions on the landscape. Included soils make up 5 to 10 percent of the unit.

Permeability is moderate in the subsoil of this Rib soil and very rapid in the substratum. The available water capacity is moderate. The organic matter content is high or very high in the surface layer. The rooting depth of most plants is limited by a seasonal high water table, which is near or above the surface in undrained areas.

Most areas support wetland vegetation. A few are used as pasture. Because of the wetness, a scarcity of suitable drainage outlets, the flooding, and the hazard of frost late in spring and early in fall, this soil is generally not suited to cultivated crops. It is poorly suited to pasture. Establishing or maintaining an improved pasture is difficult because of the wetness. Grazing is limited to the short periods when the soil is dry. The native vegetation is generally of poor quality for forage.

This soil is suited to trees. The equipment limitation, seedling mortality, and the windthrow hazard are management concerns. Because of the wetness, hand planting or machine planting on prepared ridges is generally needed if natural regeneration is unreliable. Selection of vigorous nursery stock for planting reduces the seedling mortality rate. Harvesting is frequently limited to periods when the ground is frozen. Harvesting by clearcut or area-selection methods helps to prevent windthrow of the remaining trees. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

This soil generally is not suitable as a site for septic tank absorption fields, dwellings, or local roads and streets, mainly because of the flooding and the ponding. Overcoming these hazards is difficult. A better suited site should be considered.

The land capability classification is VIw in undrained areas. The woodland ordination symbol is 2W.

RfA—**Richford loamy sand, 0 to 3 percent slopes.** This deep, nearly level and gently sloping, well drained and somewhat excessively drained soil is in slightly convex areas on stream terraces and outwash plains. Individual areas are irregular in shape and generally range from 10 to 100 acres in size.

Typically, the surface layer is dark brown loamy sand about 8 inches thick. The subsurface layer is dark brown and yellowish brown loamy sand about 14 inches thick. The subsoil also is about 14 inches thick. It is dark brown. It is friable sandy loam in the upper part and very friable loamy sand in the lower part. The substratum to a depth of about 60 inches is yellowish brown coarse sand and gravel. In places cobbles are on the surface.

Included with this soil in mapping are small areas of the excessively drained Menahga and well drained Rosholt soils. Menahga soils are sandy throughout, and Rosholt soils have a loamy surface layer and subsoil. Both of these soils are in positions on the landscape similar to those of the Richford soil. They make up 10 to 15 percent of the unit.

Permeability is moderately rapid in the upper part of the subsoil in the Richford soil and rapid in the lower part and in the substratum. The available water capacity is low. Natural fertility also is low. The organic matter content is very low or low in the surface layer. This layer is very friable and can be easily tilled throughout a wide range of moisture content. The rooting depth of most crops is limited by droughtiness.

Most areas are used as cropland. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If irrigated, it is suited to vegetables, such as snap beans, potatoes, sweet corn, and peas. In most years crop yields are limited by the low available water capacity. If cultivated crops are grown, soil blowing is a hazard. It can be controlled by field windbreaks, wind stripcropping, winter cover crops, and conservation tillage. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazard of soil blowing.

A cover of pasture plants is effective in controlling soil blowing. Forage yields are generally low unless fertilizer is applied and the supply of moisture is adequate. Planting early in the spring, before the soil has a chance to dry out, helps to overcome the droughtiness. Planting later in the year is likely to result in a poor survival rate. Overgrazing can cause surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Measures that improve fertility, proper stocking rates, and pasture rotation help to keep the pasture in good condition.

This soil is suited to trees. Seedling mortality is the main management concern. Seedling survival can be improved by careful planting of vigorous nursery stock. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

This soil is suited to dwellings and to local roads and streets. It readily absorbs the effluent in septic tank absorption fields. It does not adequately filter the effluent, however, because of the rapid permeability. The poor filtering capacity can result in the pollution of ground water.

The land capability classification is IIIs. The woodland ordination symbol is 4S.

RoA—Rosholt sandy loam, 0 to 2 percent slopes. This deep, nearly level, well drained soil is in plane areas on outwash plains and stream terraces. Individual areas are irregular in shape and generally range from 10 to 200 acres in size.

Typically, the surface layer is very dark grayish brown sandy loam about 7 inches thick. The subsurface layer is mostly brown and yellowish brown sandy loam about 17 inches thick. The subsoil is about 14 inches thick. It is dark brown and friable. It is loam in the upper part and sandy loam in the lower part. The substratum to a depth of about 60 inches is yellowish brown, stratified sand and gravel. In places the surface layer is loam. In some areas cobbles are on the surface.

Included with this soil in mapping are small areas of the moderately well drained Scott Lake soils. These soils are in the lower positions on the landscape. They make up 5 to 15 percent of the unit.

Permeability is moderate or moderately rapid in the subsoil of the Rosholt soil and rapid or very rapid in the substratum. The available water capacity is low. The organic matter content is moderately low or moderate in the surface layer. This layer is very friable and can be easily tilled throughout a wide range of moisture content. The rooting depth of most crops is limited by droughtiness in the substratum.

Most areas are used as cropland. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. In most years crop yields are limited by the low available water capacity. If cultivated crops are grown, soil blowing is a hazard. It can be controlled by conservation tillage, winter cover crops, and field windbreaks. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazard of soil blowing.

A cover of pasture plants is effective in controlling soil blowing. Overgrazing can cause surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, measures that improve fertility, and pasture rotation help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

This soil is suited to dwellings. It readily absorbs the effluent in septic tank absorption fields. It does not adequately filter the effluent, however, because of the rapid or very rapid permeability in the substratum. The poor filtering capacity can result in the pollution of ground water.

Because of the potential for frost action, this soil is only moderately suited to local roads and streets. Replacing the upper part of the soil with coarse textured base material, such as sand or gravel, helps to prevent the damage caused by frost action.

The land capability classification is IIs. The woodland ordination symbol is 3A.

RoB—Rosholt sandy loam, 2 to 6 percent slopes. This deep, gently sloping, well drained soil is in slightly convex areas on outwash plains and stream terraces. Individual areas are irregular in shape and generally range from 5 to 100 acres in size.

Typically, the surface layer is dark brown sandy loam about 8 inches thick. The subsoil is about 24 inches thick. It is mostly dark brown. It is friable sandy loam in the upper part and very friable gravelly sandy loam in the lower part. The substratum to a depth of about 60 inches is reddish brown, stratified sand and gravel. In places the surface layer is loam. In some areas cobbles are on the surface. In other areas the slope is less than 2 or more than 6 percent.

Included with this soil in mapping are small areas of the moderately well drained Scott Lake soils. These soils are in the lower positions on the landscape. They make up 5 to 15 percent of the unit.

Permeability is moderate or moderately rapid in the subsoil of the Rosholt soil and rapid or very rapid in the substratum. The available water capacity is low. The organic matter content is moderately low or moderate in the surface layer. This layer is very friable and can be easily tilled throughout a wide range of moisture content. The rooting depth of most crops is limited by droughtiness in the substratum.

Most areas are used as cropland. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. In most years crop yields are limited by the low available water capacity. If cultivated crops are grown, water erosion is a slight or moderate hazard. Also, the soil is subject to soil blowing. Conservation tillage, grassed waterways, and field windbreaks help to control erosion and soil blowing. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazards of erosion and soil blowing.

A cover of pasture plants is effective in controlling erosion and soil blowing. Overgrazing can cause surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, measures that improve fertility, and pasture rotation help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

This soil is suited to dwellings. It readily absorbs the effluent in septic tank absorption fields. It does not adequately filter the effluent, however, because of the rapid or very rapid permeability in the substratum. The poor filtering capacity can result in the pollution of ground water.

Because of the potential for frost action, this soil is only moderately suited to local roads and streets. Replacing the upper part of the soil with coarse textured base material, such as sand or gravel, helps to prevent the damage caused by frost action.

The land capability classification is IIe. The woodland ordination symbol is 3A.

RoC2—Rosholt sandy loam, 6 to 12 percent slopes, eroded. This deep, sloping, well drained soil is on side slopes and knolls on outwash plains and stream terraces. Individual areas are irregular in shape and generally range from 5 to 50 acres in size.

In most cultivated areas on the crest of hills and the upper side slopes, erosion has removed most of the original surface layer. Typically, the remaining surface layer is very dark grayish brown sandy loam about 4 inches thick. The subsoil is about 26 inches thick. It is dark brown. It is friable sandy loam in the upper part and very friable loamy sand in the lower part. The substratum to a depth of about 60 inches is strong brown, stratified sand and gravel. In places the surface layer is loam. In some areas cobbles are on the surface. In other areas the slope is less than 6 or more than 12 percent.

Included with this soil in mapping are small areas of the moderately well drained Scott Lake soils. These soils are in the lower positions on the landscape. They make up 5 to 15 percent of the unit.

Permeability is moderate or moderately rapid in the subsoil of the Rosholt soil and rapid or very rapid in the substratum. The available water capacity is low. The organic matter content is moderately low or moderate in the surface layer. This layer is very friable and can be easily tilled throughout a wide range of moisture content. The rooting depth of most crops is limited by droughtiness in the sandy part of the subsoil and in the sand and gravel substratum.

Most areas are used as cropland. A few are used as pasture. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. In most years crop yields are limited by the low available water capacity. If cultivated crops are grown, water erosion is a moderate hazard. Also, the soil is subject to soil blowing. Conservation tillage, field windbreaks, contour farming, contour stripcropping, and grassed waterways help to control erosion and soil blowing. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazards of erosion and soil blowing.

A cover of pasture plants is effective in controlling erosion and soil blowing. Overgrazing can cause surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, measures that improve fertility, and pasture rotation help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

This soil readily absorbs the effluent in septic tank absorption fields. It does not adequately filter the effluent, however, because of the rapid or very rapid permeability in the substratum. The poor filtering capacity can result in the pollution of ground water.

Because of the slope, this soil is only moderately suited to dwellings. This limitation can be overcome by cutting and filling, by installing retaining walls, or by designing the dwellings so that one side of the basement fronts on the lower part of the slope. Also, the dwellings can be constructed in the included areas where the slope is less than 6 percent.

Because of the slope and the potential for frost action, this soil is only moderately suited to local roads and streets. The slope can be overcome by shaping the roadway through cutting and filling. Also, the road can be built in the less sloping areas. Replacing the upper part of the soil with coarse textured base material, such as sand or gravel, helps to prevent the damage caused by frost action.

The land capability classification is IIIe. The woodland ordination symbol is 3A.

RpA—Rosholt loam, 0 to 2 percent slopes. This deep, nearly level, well drained soil is in plane areas on outwash plains and stream terraces. Individual areas are irregular in shape and generally range from 5 to 20 acres in size.

Typically, the surface layer is very dark grayish brown loam about 8 inches thick. The subsurface layer is mostly brown loam about 7 inches thick. The subsoil is about 19 inches thick. The upper part is dark brown, friable loam; the next part is dark brown, friable sandy loam; and the lower part is brown, very friable loamy sand. The substratum to a depth of about 60 inches is yellowish brown, stratified sand and gravel. In places the surface layer is sandy loam. In some areas the content of gravel and cobbles in the surface layer is as much as 5 percent.

Included with this soil in mapping are small areas of the moderately well drained Scott Lake soils. These soils are in the slightly lower positions on the landscape. They make up 5 to 10 percent of the unit.

Permeability is moderate or moderately rapid in the subsoil of the Rosholt soil and rapid or very rapid in the substratum. The available water capacity is moderate. The organic matter content is moderately low or moderate in the surface layer. This layer is friable and can be easily tilled throughout a wide range of moisture content. The rooting depth of most crops is limited by droughtiness in the sandy part of the subsoil and in the sand and gravel substratum.

Most areas are used as cropland. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Applying a system of conservation tillage and returning crop residue to the soil or adding other organic material help to maintain fertility and good tilth and increase the rate of water infiltration.

This soil is suited to pasture. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, pasture rotation, measures that improve fertility, and timely deferment of grazing help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

This soil is suited to dwellings. It readily absorbs the effluent in septic tank absorption fields. It does not adequately filter the effluent, however, because of the rapid or very rapid permeability in the substratum. The poor filtering capacity can result in the pollution of ground water.

Because of the potential for frost action, this soil is only moderately suited to local roads and streets. Replacing the upper part of the soil with coarse textured base material, such as sand or gravel, helps to prevent the damage caused by frost action.

The land capability classification is IIs. The woodland ordination symbol is 3A.

RpB—Rosholt loam, 2 to 6 percent slopes. This deep, gently sloping, well drained soil is in slightly convex areas on outwash plains and stream terraces. Individual areas are irregular in shape and generally range from 5 to 100 acres in size.

Typically, the surface layer is dark brown loam about 9 inches thick. The subsoil is about 25 inches thick. The upper part is mostly dark brown, friable loam; the next part is dark brown, friable sandy loam; and the lower part is reddish brown, very friable gravelly loamy sand. The substratum to a depth of about 60 inches is yellowish red, stratified sand and gravel. In places the surface layer is sandy loam. In some areas the content of gravel and cobbles in the surface layer is as much as 5 percent.

Included with this soil in mapping are small areas of the moderately well drained Scott Lake soils. These soils are in the slightly lower positions on the landscape. They make up 5 to 10 percent of the unit.

Permeability is moderate or moderately rapid in the subsoil of the Rosholt soil and rapid or very rapid in the substratum. The available water capacity is moderate. The organic matter content is moderately low or moderate in the surface layer. This layer is friable and can be easily tilled throughout a wide range of moisture content. The rooting depth of most crops is limited by droughtiness in the sandy part of the subsoil and in the sand and gravel substratum.

Most areas are used as cropland. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, water erosion is a slight or moderate hazard. It can be controlled by contour farming, contour stripcropping, conservation tillage, and grassed waterways. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazard of erosion.

A cover of pasture plants is effective in controlling erosion. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, pasture rotation, measures that improve fertility, and timely deferment of grazing help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

This soil is suited to dwellings. It readily absorbs the effluent in septic tank absorption fields. It does not adequately filter the effluent, however, because of the rapid or very rapid permeability in the substratum. The poor filtering capacity can result in the pollution of ground water.

Because of the potential for frost action, this soil is only moderately suited to local roads and streets. Replacing the upper part of the soil with coarse textured base material, such as sand or gravel, helps to prevent the damage caused by frost action.

The land capability classification is IIe. The woodland ordination symbol is 3A.

RpC2—Rosholt loam, 6 to 12 percent slopes, eroded. This deep, sloping, well drained soil is on side slopes on outwash plains and stream terraces. Individual areas are irregular in shape and generally range from 5 to 50 acres in size.

In most cultivated areas on the crest of hills and the upper side slopes, erosion has removed most of the original surface layer. Typically, the remaining surface layer is very dark grayish brown loam about 8 inches thick. The subsurface layer is mostly brown loam about 6 inches thick. The subsoil is about 20 inches thick. The upper part is dark brown, friable loam; the next part is reddish brown, friable sandy loam; and the lower part is yellowish red, very friable gravelly loamy sand. The substratum to a depth of about 60 inches is yellowish red, stratified sand and gravel. In some places the surface layer and subsoil are sandy loam. In other places the depth to sand and gravel is 16 to 24 inches. In some areas cobbles are on the surface. In other areas the slope is less than 6 or more than 12 percent.

Permeability is moderate or moderately rapid in the subsoil of the Rosholt soil and rapid or very rapid in the substratum. The available water capacity is moderate. The organic matter content is moderately low or moderate in the surface layer. This layer is friable and can be easily tilled throughout a wide range of moisture content. The rooting depth of most crops is limited by the droughtiness in the sandy part of the subsoil and in the sand and gravel substratum.

Most areas are used as cropland or pasture. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, water erosion is a moderate hazard. It can be controlled by contour farming, contour stripcropping, conservation tillage, and grassed waterways. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazard of erosion.

A cover of pasture plants is effective in controlling erosion. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, pasture rotation, measures that improve fertility, and timely deferment of grazing help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

This soil readily absorbs the effluent in septic tank absorption fields. It does not adequately filter the effluent, however, because of the rapid or very rapid permeability in the substratum. The poor filtering capacity can result in the pollution of ground water.

Because of the slope, this soil is only moderately suited to dwellings. This limitation can be overcome by cutting and filling, by installing retaining walls, or by designing the dwellings so that one side of the basement fronts on the lower part of the slope. Also, the dwellings can be constructed in the included areas where the slope is less than 6 percent.

Because of the slope and the potential for frost action, this soil is only moderately suited to local roads and streets. The slope can be overcome by shaping the roadway through cutting and filling. Also, the road can be built in the less sloping areas. Replacing the upper part of the soil with coarse textured base material, such as sand or gravel, helps to prevent the damage caused by frost action.

The land capability classification is IIIe. The woodland ordination symbol is 3A.

SaB—Santiago silt loam, 2 to 6 percent slopes. This deep, gently sloping, well drained soil is in slightly convex areas on ground moraines. Individual areas are irregular in shape and generally range from 5 to 100 acres in size.

Typically, the surface layer is dark brown silt loam about 10 inches thick. The subsurface layer is mostly brown silt loam about 5 inches thick. The subsoil is about 15 inches thick. It is friable. The upper part is mostly dark brown silt loam, the next part is reddish brown loam, and the lower part is yellowish red sandy loam. The substratum to a depth of about 60 inches is reddish brown sandy loam. In places cobbles are on the surface. In some areas sand and gravel are below a depth of 40 inches.

Included with this soil in mapping are small areas of the moderately well drained Freeon soils. These soils are in depressions on the lower parts of the landscape. They make up 5 to 10 percent of the unit.

Permeability is moderate in the Santiago soil. The available water capacity is high. The organic matter content is moderate in the surface layer. This layer is friable and can be easily tilled, but it tends to crust and puddle after hard rains or if it is tilled when too wet.

Most areas are used as cropland. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, water erosion is a slight or moderate hazard. It can be controlled by contour farming, contour stripcropping, conservation tillage, and grassed waterways. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazard of erosion.

A cover of pasture plants is effective in controlling erosion. The surface layer is subject to crusting, which restricts the emergence of the plants. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, measures that improve fertility, and restricted use during wet periods help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

This soil is suited to dwellings. It is only moderately suited to septic tank absorption fields because of the moderate permeability. Mounding the site with suitable filtering material helps to overcome this limitation. Also, the effluent can be pumped to an absorption field on a better suited soil in some nearby areas.

Because of the potential for frost action, this soil is only moderately suited to local roads and streets. Replacing the upper part of the soil with coarse textured base material, such as sand or gravel, helps to prevent the damage caused by frost action.

The land capability classification is IIe. The woodland ordination symbol is 4A.

SaC2—Santiago silt loam, 6 to 12 percent slopes, eroded. This deep, sloping, well drained soil is on side slopes and knolls on ground moraines. Individual areas are irregular in shape and generally range from 5 to 80 acres in size.

In most cultivated areas on the crest of hills and the upper side slopes, erosion has removed most of the original surface layer. Typically, the remaining surface layer is dark brown silt loam about 7 inches thick. The subsurface layer is mostly brown silt loam about 6 inches

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thick. The subsoil is about 17 inches thick. It is friable. The upper part is mostly dark yellowish brown and dark brown silt loam, the next part is dark brown loam, and the lower part is reddish brown sandy loam. The substratum to a depth of about 60 inches is dark reddish brown sandy loam. In places cobbles are on the surface. In some areas sand and gravel are below a depth of 40 inches.

Included with this soil in mapping are small areas of the moderately well drained Freeon soils. These soils are in the lower positions on the landscape. They make up 5 to 15 percent of the unit.

Permeability is moderate in the Santiago soil. The available water capacity is high. The organic matter content is moderate in the surface layer. This layer is friable and can be easily tilled, but it tends to crust and puddle after hard rains or if it is tilled when too wet.

Most areas are used as cropland or pasture. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, water erosion is a moderate hazard. It can be controlled by contour farming, contour stripcropping, conservation tillage, and grassed waterways. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazard of erosion.

A cover of pasture plants is effective in controlling erosion. The surface layer is subject to crusting, which restricts the emergence of the plants. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, measures that improve fertility, and restricted use during wet periods help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

Because of the moderate permeability and the slope, this soil is only moderately suited to septic tank absorption fields. Mounding the site with suitable filtering material helps to overcome the moderate permeability. Also, the effluent can be pumped to an absorption field on a better suited soil in some nearby areas. The slope can be overcome by cutting and filling or by installing a trench absorption system on the contour.

Because of the slope, this soil is only moderately suited to dwellings. This limitation can be overcome by cutting and filling or by installing retaining walls. Also, the dwelling can be designed so that one side of the basement fronts on the lower part of the slope.

Because of the slope and the potential for frost action, this soil is only moderately suited to local roads and streets. The slope can be overcome by shaping the roadway through cutting and filling. Also, the road can be built in the less sloping areas. Replacing the upper part of the soil with coarse textured base material, such as sand or gravel, helps to prevent the damage caused by frost action.

The land capability classification is IIIe. The woodland ordination symbol is 4A.

SaD2—Santiago silt loam, 12 to 20 percent slopes, eroded. This deep, moderately steep, well drained soil is on side slopes on ground moraines. Individual areas are irregular in shape and generally range from 5 to 30 acres in size.

In most cultivated areas on the crest of hills and the upper side slopes, erosion has removed most of the original surface layer. Typically, the remaining surface layer is very dark grayish brown silt loam about 6 inches thick. The subsurface layer is brown silt loam about 3 inches thick. The subsoil is about 27 inches thick. It is friable. It is mostly yellowish brown silt loam in the upper part and dark reddish brown and reddish brown loam in the lower part. The substratum to a depth of about 60 inches is reddish brown sandy loam. In places cobbles are on the surface. In some areas the slope is less than 12 or more than 20 percent.

Included with this soil in mapping are small areas of the well drained Arland soils. These soils are in positions on the landscape similar to those of the Santiago soil. They are underlain by sandstone. They make up 5 to 15 percent of the unit.

Permeability is moderate in the Santiago soil. The available water capacity is high. The organic matter content is moderate in the surface layer. This layer is friable and can be easily tilled, but it tends to crust and puddle after hard rains or if it is tilled when too wet.

Most areas are used as cropland or pasture. This soil is suited to corn and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, water erosion is a severe hazard. It can be controlled by contour farming, contour stripcropping, crop rotations that include grasses and legumes, and conservation tillage. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazard of erosion.

A cover of pasture plants is effective in controlling erosion. The surface layer is subject to crusting, which restricts the emergence of the plants. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, measures that improve fertility, and restricted use during wet periods help to keep the pasture in good condition.

This soil is suited to trees. The erosion hazard and the equipment limitation are management concerns. Planting on the contour and carefully locating skid roads during harvest minimize erosion. Seedling survival on the steeper slopes facing south or west can be improved by careful planting of vigorous nursery stock. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

Because of the slope, this soil is poorly suited to septic tank absorption fields, dwellings, and local roads and streets. This limitation can be overcome by cutting and filling. It also can be overcome by installing a trench absorption system on the contour, by designing dwellings so that one side of the basement fronts on the lower part of the slope, by installing retaining walls, and by building roads in the less sloping areas.

The land capability classification is IVe. The woodland ordination symbol is 4R.

SbA—Sattre loam, 0 to 3 percent slopes. This deep, nearly level and gently sloping, well drained soil is in plane areas on stream terraces and outwash plains. Individual areas are irregular in shape and generally range from 10 to 300 acres in size.

Typically, the surface layer is very dark grayish brown loam about 9 inches thick. The subsurface layer is brown loam about 3 inches thick. The subsoil is about 23 inches thick. It is dark brown and friable. It is loam in the upper part and gravelly sandy loam in the lower part. The substratum to a depth of about 60 inches is strong brown sand and gravel. In places the surface layer and the upper part of the subsoil are sandy loam. In some areas a few cobbles are on the surface.

Permeability is moderate or moderately rapid in the subsoil of the Sattre soil and very rapid in the substratum. The available water capacity is moderate. The organic matter content is moderate in the surface layer. This layer is friable and can be easily tilled throughout a wide range of moisture content. The rooting depth of most crops is limited by droughtiness in the substratum.

Most areas are used as cropland. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Applying a system of conservation tillage and returning crop residue to the soil or adding other organic material help to maintain fertility and good tilth and increase the rate of water infiltration.

This soil is suited to pasture. Overgrazing can cause surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, measures that improve fertility, and pasture rotation help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

This soil is suited to dwellings and to local roads and streets. It readily absorbs the effluent in septic tank absorption fields. It does not adequately filter the effluent, however, because of the very rapid permeability. The poor filtering capacity can result in the pollution of ground water.

The land capability classification is IIs. The woodland ordination symbol is 4A.

ScB—Scott Lake sandy loam, 1 to 6 percent slopes. This deep, nearly level and gently sloping, moderately well drained soil is in convex areas on outwash plains and stream terraces. Individual areas are irregular in shape and generally range from 5 to 20 acres in size.

Typically, the surface layer is dark grayish brown sandy loam about 8 inches thick. The subsurface layer is brown sandy loam about 8 inches thick. The subsoil is mostly dark brown, mottled, friable sandy loam about 20 inches thick. The substratum to a depth of about 60 inches is yellowish brown, stratified sand and gravel. In some places the surface layer is loam. In other places the lower part of the substratum is stratified very fine sandy loam and silt. In some areas the slope is more than 6 percent.

Included with this soil in mapping are small areas of the somewhat poorly drained Halder, moderately well drained Moundville, and well drained Rosholt soils. Halder soils are loam in the surface layer and in the upper part of the subsoil. They are in the lower positions on the landscape. Moundville soils are in positions similar to those of the Scott Lake soil. They formed in sandy deposits. Rosholt soils are in the slightly higher areas. Included soils make up 5 to 10 percent of the unit.

Permeability is moderate or moderately rapid in the subsoil of the Scott Lake soil and rapid or very rapid in the substratum. The available water capacity is low. The organic matter content is moderately low or moderate in the surface layer. This layer is friable and can be easily tilled throughout a wide range of moisture content. The rooting depth of most crops is limited by droughtiness in the substratum. The depth to the seasonal high water table ranges from 2.5 to 6.0 feet.

Most areas are used as cropland. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. In most years crop yields are limited by the low available water capacity. If cultivated crops are grown, water erosion is a slight or moderate hazard. Also, the soil is subject to soil blowing.

Conservation tillage, grassed waterways, and field windbreaks help to control erosion and soil blowing. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazards of erosion and soil blowing.

A cover of pasture plants is effective in controlling erosion and soil blowing. Overgrazing can cause surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, measures that improve fertility, and pasture rotation help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

This soil readily absorbs the effluent in septic tank absorption fields. It does not adequately filter the effluent, however, because of the rapid or very rapid permeability in the substratum. The poor filtering capacity can result in the pollution of ground water. The wetness also is a limitation. Mounding the site with suitable filtering material helps to overcome the wetness and the poor filtering capacity. Also, the effluent can be pumped to an absorption field on a better suited soil in some nearby areas.

This soil is suited to dwellings without basements, but it is only moderately suited to dwellings with basements because of the wetness. This limitation can be overcome by installing tile drains around the foundations and providing gravity outlets or other dependable outlets and by constructing the foundations on coarse textured fill material above the level of wetness.

Because of the potential for frost action, this soil is only moderately suited to local roads and streets. This limitation can be overcome by replacing the upper part of the soil with coarse textured base material, such as sand or gravel.

The land capability classification is IIe. The woodland ordination symbol is 4A.

SdA—Scott Lake loam, 0 to 3 percent slopes. This deep, nearly level and gently sloping, moderately well drained soil is in slightly convex areas on outwash plains and stream terraces. Individual areas are irregular in shape and generally range from 5 to 80 acres in size.

Typically, the surface layer is very dark grayish brown loam about 8 inches thick. The subsoil is about 28 inches thick. It is friable. The upper part is mostly dark brown loam; the next part is dark yellowish brown, mottled loam; and the lower part is dark brown, mottled sandy loam. The substratum to a depth of about 60 inches is dark brown and dark yellowish brown, stratified sand and gravel. In places the surface layer is sandy loam. In some areas cobbles are on the surface.

Included with this soil in mapping are small areas of the somewhat poorly drained Halder and well drained Rosholt soils. Halder soils are loam in the surface layer and in the upper part of the subsoil. They are in the slightly lower positions on the landscape. Rosholt soils are in the slightly higher positions. Included soils make up 5 to 10 percent of the unit.

Permeability is moderate or moderately rapid in the subsoil of the Scott Lake soil and rapid or very rapid in the substratum. The available water capacity is moderate. The organic matter content is moderate in the surface layer. This layer is friable and can be easily tilled, but it tends to crust and puddle after hard rains or if it is tilled when too wet. The rooting depth of most crops is limited by droughtiness in the substratum. The depth to the seasonal high water table ranges from 2.5 to 6.0 feet.

Most areas are used as cropland. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Applying a system of conservation tillage and returning crop residue to the soil or adding other organic material help to maintain fertility and good tilth and increase the rate of water infiltration.

This soil is suited to pasture. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, measures that improve fertility, and restricted use during wet periods help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

This soil readily absorbs the effluent in septic tank absorption fields. It does not adequately filter the effluent, however, because of the rapid or very rapid permeability in the substratum. The poor filtering capacity can result in the pollution of ground water. The wetness also is a limitation. Mounding the site with suitable filtering material helps to overcome the wetness and the poor filtering capacity. Also, the effluent can be pumped to an absorption field on a better suited soil in some nearby areas.

This soil is suited to dwellings without basements, but it is only moderately suited to dwellings with basements because of the wetness. This limitation can be overcome by installing tile drains around the foundations and providing gravity outlets or other dependable outlets and by constructing the foundations on coarse textured fill material above the level of wetness.

Because of the potential for frost action, this soil is only moderately suited to local roads and streets. This limitation can be overcome by replacing the upper part of the soil with coarse textured base material, such as sand or gravel.

The land capability classification is IIs. The woodland ordination symbol is 4A.

SeB—Seaton silt loam, 2 to 6 percent slopes. This deep, gently sloping, well drained soil is on the tops of ridges in the uplands. Individual areas are irregular in shape and generally range from 5 to 150 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 8 inches thick. The subsurface layer is brown silt loam about 3 inches thick. The subsoil is dark yellowish brown and yellowish brown, friable silt loam about 33 inches thick. The substratum to a depth of about 60 inches is yellowish brown silt loam. In places the slope is more than 6 percent.

Included with this soil in mapping are small areas of the well drained Gale and moderately well drained Seaton soils. Gale soils are underlain by sandstone. They are in the higher positions on the landscape. The wetter Seaton soils are in the lower positions. Included soils make up 2 to 10 percent of the unit.

Permeability is moderate in this Seaton soil. The available water capacity is very high. The organic matter content is moderately low or moderate in the surface layer. This layer is friable and can be easily tilled, but it tends to crust and puddle after hard rains or if it is tilled when too wet.

Most areas are used as cropland. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, water erosion is a slight or moderate hazard. It can be controlled by terraces, grassed waterways, contour farming, contour stripcropping, and conservation tillage. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazard of erosion.

A cover of pasture plants is effective in controlling erosion. The surface layer is subject to crusting, which restricts the emergence of the plants. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, pasture rotation, measures that improve fertility, and restricted use during wet periods help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

This soil is suited to septic tank absorption fields and dwellings. It is poorly suited to local roads and streets because of low strength and the potential for frost action. These limitations can be overcome by replacing the upper part of the soil with coarse textured base material, such as sand or gravel. Low strength also can be overcome by increasing the thickness of the pavement or the base material.

The land capability classification is IIe. The woodland ordination symbol is 5A.

SeC2—Seaton silt loam, 6 to 12 percent slopes, eroded. This deep, sloping, well drained soil is on side slopes in the uplands. Individual areas are irregular in shape and generally range from 5 to 200 acres in size.

In most cultivated areas on the crest of hills and the upper side slopes, erosion has removed most of the original surface layer. Typically, the remaining surface layer is dark grayish brown silt loam about 7 inches thick. The subsurface layer is brown silt loam about 3 inches thick. The subsoil is yellowish brown and dark yellowish brown, friable silt loam about 32 inches thick. The substratum to a depth of about 60 inches is yellowish brown silt loam. In places the lower part of the substratum is sandy loam. In some areas the slope is less than 6 or more than 12 percent.

Included with this soil in mapping are small areas of the well drained Gale soils. These soils are underlain by sandstone. They are in the higher positions on the landscape. They make up 2 to 10 percent of the unit.

Permeability is moderate in the Seaton soil. The available water capacity is very high. The organic matter content is moderately low or moderate in the surface layer. This layer is friable and can be easily tilled, but it tends to crust and puddle after hard rains or if it is tilled when too wet.

Most areas are used as cropland. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, water erosion is a moderate hazard. It can be controlled by terraces, contour farming, contour stripcropping, grassed waterways, and conservation tillage. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazard of erosion.

A cover of pasture plants is effective in controlling erosion. The surface layer is subject to crusting, which restricts the emergence of the plants. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, pasture rotation, measures that improve fertility, and restricted use during wet periods help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

Because of the slope, this soil is only moderately suited to septic tank absorption fields. This limitation can be overcome by cutting and filling or by installing a trench absorption system on the contour. Also, the absorption field can be installed in the included areas where the slope is less than 6 percent.

Because of the slope, this soil is only moderately suited to dwellings. This limitation can be overcome by cutting and filling, by installing retaining walls, or by designing the dwellings so that one side of the basement fronts on the lower part of the slope. Also, the dwellings can be constructed in the included areas where the slope is less than 6 percent.

Because of low strength and the potential for frost action, this soil is poorly suited to local roads and streets. These limitations can be overcome by replacing the upper part of the soil with coarse textured base material, such as sand or gravel. Low strength also can be overcome by increasing the thickness of the pavement or the base material.

The land capability classification is IIIe. The woodland ordination symbol is 5A.

SeD2—Seaton silt loam, 12 to 25 percent slopes, eroded. This deep, moderately steep and steep, well drained soil is on side slopes in the uplands. Individual areas are irregular in shape and generally range from 5 to 70 acres in size.

In most cultivated areas on the crest of hills and the upper side slopes, erosion has removed most of the original surface layer. Typically, the remaining surface layer is dark brown silt loam about 8 inches thick. The subsoil is dark yellowish brown and yellowish brown, friable silt loam about 28 inches thick. The substratum to a depth of about 60 inches is yellowish brown silt loam. In places the lower part of the substratum is sandy loam. In some areas the slope is less than 12 or more than 25 percent.

Included with this soil in mapping are small areas of the well drained Gale soils. These soils are underlain by sandstone. They are in the higher positions on the landscape. They make up 5 to 10 percent of the unit.

Permeability is moderate in the Seaton soil. The available water capacity is very high. The organic matter content is moderately low or moderate in the surface layer. This layer is friable and can be easily tilled, but it tends to crust and puddle after hard rains or if it is tilled when too wet.

Most areas are used as cropland or pasture. This soil is suited to corn and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, water erosion is a severe hazard. It can be controlled by contour farming, contour stripcropping, crop rotations that include grasses and legumes, and conservation tillage. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazard of erosion.

A cover of pasture plants is effective in controlling erosion. The surface layer is subject to crusting, which restricts the emergence of the plants. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, measures that improve fertility, and restricted use during wet periods help to keep the pasture in good condition.

This soil is suited to trees. The erosion hazard, the equipment limitation, and seedling mortality are management concerns. Planting on the contour and carefully locating skid roads during harvest minimize erosion. Seedling survival on the steeper slopes facing south or west can be improved by careful planting of vigorous nursery stock. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

Because of the slope, this soil is poorly suited to septic tank absorption fields. This limitation can be overcome by cutting and filling or by installing a trench absorption system on the contour.

Because of the slope, this soil is poorly suited to dwellings. This limitation can be overcome by cutting and filling or by installing retaining walls. Also, the dwellings can be designed so that one side of the basement fronts on the lower part of the slope.

Because of low strength, the slope, and the potential for frost action, this soil is poorly suited to local roads and streets. Low strength and frost action can be overcome by replacing the upper part of the soil with coarse textured base material, such as sand or gravel. Low strength also can be overcome by increasing the thickness of the pavement or the base material. The slope can be overcome by shaping the roadway through cutting and filling. Also, the road can be built in the less sloping areas.

The land capability classification is IVe. The woodland ordination symbol is 5R.

SfA—Seaton silt loam, moderately well drained, 0 to 3 percent slopes. This deep, nearly level and gently sloping, moderately well drained soil is in plane areas on uplands. Individual areas are irregular in shape and generally range from 5 to 60 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 9 inches thick. The subsurface layer is brown silt loam about 5 inches thick. The subsoil is friable silt loam about 28 inches thick. It is dark yellowish brown in the upper part and yellowish brown and mottled in the lower part. The substratum to a depth of about 60 inches is brown, mottled silt loam. In places the surface layer is thicker and darker.

Included with this soil in mapping are small areas of the somewhat poorly drained Comstock soils and the well drained Seaton soils that have a sandy substratum. Comstock soils are in the slightly lower positions on the landscape. The better drained Seaton soils are in positions similar to those of this Seaton soil. They are sandy in the lower part of the substratum. Included soils make up 2 to 5 percent of the unit.

Permeability is moderate in this Seaton soil. The available water capacity is very high. The organic matter content is moderate in the surface layer. This layer is friable and can be easily tilled, but it tends to crust and puddle after hard rains or if it is tilled when too wet. The depth to the seasonal high water table ranges from 3 to 6 feet.

Most areas are used as cropland. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Applying a system of conservation tillage and returning crop residue to the soil or adding other organic material help to maintain fertility and good tilth and increase the rate of water infiltration.

This soil is suited to pasture. The surface layer is subject to crusting, which restricts the emergence of the plants. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, measures that improve fertility, and restricted use during wet periods help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

Because of the wetness, this soil is poorly suited to septic tank absorption fields. This limitation can be overcome by mounding the site with suitable filtering material. Also, the effluent can be pumped to an absorption field on a better suited soil in some nearby areas.

This soil is suited to dwellings without basements, but it is only moderately suited to dwellings with basements because of the wetness. This limitation can be overcome by installing tile drains around the foundations and providing gravity outlets or other dependable outlets and by constructing the foundations on coarse textured fill material above the level of wetness.

Because of low strength and the potential for frost action, this soil is poorly suited to local roads and streets. These limitations can be overcome by replacing the upper part of the soil with coarse textured base material, such as sand or gravel. Low strength also can be overcome by increasing the thickness of the pavement or the base material.

The land capability classification is I. The woodland ordination symbol is 5A.

SgA—Seaton silt loam, sandy substratum, 0 to 2 percent slopes. This deep, nearly level, well drained soil is in plane areas on valley fills. Individual areas are irregular in shape and generally range from 5 to 100 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 8 inches thick. The subsurface layer is mostly brown silt loam about 8 inches thick. The subsoil is dark yellowish brown and yellowish brown, friable silt loam about 22 inches thick. The upper 10 inches of the substratum is yellowish brown silt loam. The lower part to a depth of about 60 inches is yellowish brown sand. In places the surface layer is thicker and darker.

Included with this soil in mapping are small areas of the moderately well drained Seaton soils. These soils are in positions on the landscape similar to those of this Seaton soil. They have a substratum of silt loam. They make up 2 to 5 percent of the unit.

Permeability is moderate in the upper part of this Seaton soil and rapid in the sandy part of the substratum. The available water capacity is high. The organic matter content is moderate in the surface layer. This layer is friable and can be easily tilled, but it tends to crust and puddle after hard rains or if it is tilled when too wet.

Most areas are used as cropland. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Applying a system of conservation tillage and returning crop residue to the soil or adding other organic material help to maintain fertility and good tilth and increase the rate of water infiltration.

This soil is suited to pasture. The surface layer is subject to crusting, which restricts the emergence of the plants. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, measures that improve fertility, and restricted use during wet periods help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

This soil is suited to septic tank absorption fields and dwellings. It is poorly suited to local roads and streets because of low strength and the potential for frost action. These limitations can be overcome by replacing the upper part of the soil with coarse textured base material, such as sand or gravel. Low strength also can be overcome by increasing the thickness of the pavement or the base material.

The land capability classification is I. The woodland ordination symbol is 5A.

SgB—Seaton silt loam, sandy substratum, 2 to 6 percent slopes. This deep, gently sloping, well drained soil is on foot slopes on valley fills. Individual areas are irregular in shape and generally range from 5 to 200 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 8 inches thick. The subsurface layer is mostly brown silt loam about 3 inches thick. The subsoil is dark yellowish brown, friable silt loam about 28 inches thick. The upper 18 inches of the substratum is yellowish brown silt loam. The lower part to a depth of about 60 inches is light yellowish brown sand. In places the surface layer is thicker and darker.

Included with this soil in mapping are small areas of the moderately well drained Seaton soils. These soils have a substratum of silt loam. They are in the slightly lower positions on the landscape. They make up 2 to 10 percent of the unit.

Permeability is moderate in the upper part of this Seaton soil and rapid in the sandy part of the substratum. The available water capacity is high. The organic matter content is moderate in the surface layer. This layer is friable and can be easily tilled, but it tends to crust and puddle after hard rains or if it is tilled when too wet.

Most areas are used as cropland. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, water erosion is a slight or moderate hazard. It can be controlled by terraces, contour farming, contour stripcropping, conservation tillage, and grassed waterways. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazard of erosion.

A cover of pasture plants is effective in controlling erosion. The surface layer is subject to crusting, which restricts the emergence of the plants. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, pasture rotation, measures that improve fertility, and timely deferment of grazing help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

This soil is suited to septic tank absorption fields and dwellings. It is poorly suited to local roads and streets because of low strength and the potential for frost action. These limitations can be overcome by replacing the upper part of the soil with coarse textured base material, such as sand or gravel. Low strength also can be overcome by increasing the thickness of the pavement or the base material.

The land capability classification is IIe. The woodland ordination symbol is 5A.

Sm—Seelyeville muck, 0 to 1 percent slopes. This deep, nearly level, very poorly drained soil is in depressions on outwash plains and ground moraines. It is subject to ponding and rare flooding. Individual areas are irregular in shape and generally range from 10 to 150 acres in size.

Typically, the organic material is dark brown, black, and very dark gray muck at least 60 inches thick. In places the surface layer is peat. In some areas strata of mucky peat or peat are below the surface layer.

Included with this soil in mapping are some small areas of the very poorly drained Lupton soils. These soils are in positions on the landscape similar to those of the Seelyeville soil. They formed in extremely acid organic material. They make up 5 to 15 percent of the unit.

Permeability is moderately rapid in the Seelyeville soil. The available water capacity is very high. The organic matter content also is very high. The rooting depth of most plants is limited by a seasonal high water table, which is near or above the surface in undrained areas.

Most areas support wetland vegetation. Because of the wetness, a scarcity of suitable drainage outlets, and the hazard of frost late in spring or early in fall, this soil is generally not suited to cultivated crops or pasture. If drained and cultivated, it is subject to burning and subsidence. Also, it is subject to soil blowing.

This soil is suited to trees. The equipment limitation, seedling mortality, and the windthrow hazard are management concerns. Because of the wetness, hand planting or machine planting on prepared ridges generally is needed if natural regeneration is unreliable. Selection of vigorous nursery stock for planting reduces the seedling mortality rate. Harvesting is frequently limited to periods when the ground is frozen. Harvesting by clearcut or area-selection methods helps to prevent windthrow of the remaining trees. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation.

This soil generally is not suitable as a site for septic tank absorption fields, dwellings, or local roads and streets, mainly because of the flooding and ponding.

Overcoming these hazards is difficult. A better suited site should be considered.

The land capability classification is VIw in undrained areas. The woodland ordination symbol is 8W.

So—Shiffer loam, 0 to 2 percent slopes. This deep, nearly level, somewhat poorly drained soil is in shallow depressions and drainageways on stream terraces and valley fills. Individual areas are irregular in shape and generally range from 5 to 50 acres in size.

Typically, the surface layer is very dark grayish brown loam about 9 inches thick. The subsoil is about 22 inches thick. It is brown and mottled. It is friable loam in the upper part and very friable loamy sand in the lower part. The substratum to a depth of about 60 inches is yellowish brown, mottled sand. In places the surface layer is sandy loam.

Included with this soil in mapping are small areas of the poorly drained Lows and moderately well drained Meridian soils. Lows soils are in the lower positions on the landscape. Meridian soils are in the slightly higher positions. Included soils make up 2 to 8 percent of the unit.

Permeability is moderate in the upper part of the subsoil in the Shiffer soil and rapid in the substratum. The available water capacity is moderate. The organic matter content is moderate in the surface layer. This layer is friable and can be easily tilled throughout a wide range of moisture content. The rooting depth of most crops is limited by a seasonal high water table, which is at a depth of 1 to 3 feet in undrained areas.

Most areas are used as cropland. A few are used as pasture. If drained, this soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Excess water can be removed by diversions, grassed waterways, surface drains, and interceptor subsurface drains. If tile drains are installed, the finer sand enters the tile lines unless a suitable filter covers the tile. Applying a system of conservation tillage and returning crop residue to the soil or adding other organic material help to maintain fertility and good tilth and increase the rate of water infiltration.

This soil is suited to pasture. Alfalfa is short lived unless the soil is adequately drained. Red clover is generally grown. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, measures that improve fertility, and restricted use during wet periods help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

This soil readily absorbs the effluent in septic tank absorption fields. It does not adequately filter the effluent, however, because of the rapid permeability. The poor filtering capacity can result in the pollution of ground water. The wetness also is a limitation. Mounding the site with suitable filtering material helps to overcome the wetness and the poor filtering capacity. Also, the effluent can be pumped to an absorption field on a better suited soil in some nearby areas.

Because of the wetness, this soil is poorly suited to dwellings. This limitation can be overcome by installing tile drains around foundations and providing gravity outlets or other dependable outlets and by constructing the foundations on coarse textured fill material above the level of wetness.

Because of the potential for frost action, this soil is poorly suited to local roads and streets. Replacing the upper part of the soil with coarse textured base material, such as sand or gravel, helps to prevent the damage caused by frost action.

The land capability classification is IIw. The woodland ordination symbol is 2A.

SrB—Spencer silt loam, 2 to 6 percent slopes. This deep, gently sloping, moderately well drained soil is on side slopes and knolls on ground moraines and the lower terminal moraines. Individual areas are irregular in shape and generally range from 4 to 125 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 9 inches thick. The subsurface layer is mostly brown silt loam about 6 inches thick. The subsoil is mottled, friable silt loam about 22 inches thick. It is mostly dark yellowish brown in the upper part and dark brown in the lower part. The upper 5 inches of the substratum is dark yellowish brown, mottled silt loam. The lower part to a depth of about 60 inches is yellowish red sandy loam.

Included with this soil in mapping are small areas of the somewhat poorly drained Almena soils. These soils are in the lower positions on the landscape. They make up 2 to 10 percent of the unit.

Permeability is moderate in the subsoil of the Spencer soil and moderately slow in the substratum. The available water capacity is high. The organic matter content is moderate in the surface layer. This layer is friable and can be easily tilled, but it tends to crust and puddle after hard rains or if it is tilled when too wet. The depth to the seasonal high water table ranges from 2.5 to 6.0 feet.

Most areas are used as cropland. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, water erosion is a slight or moderate hazard. It can be controlled by grassed waterways, contour farming, contour stripcropping, and conservation tillage. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazard of erosion.

A cover of pasture plants is effective in controlling erosion. The surface layer is subject to crusting, which restricts the emergence of the plants. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, pasture rotation, measures that improve fertility, and restricted use during wet periods help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

Because of the wetness and the moderately slow permeability in the substratum, this soil is poorly suited to septic tank absorption fields. Mounding the site with suitable filtering material helps to overcome these limitations. Also, the effluent can be pumped to an absorption field on a better suited soil in some nearby areas.

Because of the shrink-swell potential, this soil is only moderately suited to dwellings. This limitation can be overcome by excavating the soil and replacing it with coarse textured material, such as sand or gravel; by strengthening the basement walls; and by installing a subsurface drainage system at or below the basement elevation. The wetness is a limitation on sites for dwellings with basements. It can be overcome by installing tile drains around the foundations and providing gravity outlets or other dependable outlets and by constructing the foundations on coarse textured fill material above the level of wetness.

Because of low strength and the potential for frost action, this soil is poorly suited to local roads and streets. These limitations can be overcome by replacing the upper part of the soil with coarse textured base material, such as sand or gravel. Low strength also can be overcome by increasing the thickness of the pavement or the base material.

The land capability classification is IIe. The woodland ordination symbol is 3A.

SrC2—Spencer silt loam, 6 to 12 percent slopes, eroded. This deep, sloping, moderately well drained soil is on side slopes on ground moraines and terminal moraines. Individual areas are irregular in shape and generally range from 5 to 50 acres in size.

In most cultivated areas on the crest of hills and the upper side slopes, erosion has removed most of the original surface layer. Typically, the remaining surface layer is very dark grayish brown silt loam about 8 inches thick. The subsurface layer is mostly brown silt loam about 4 inches thick. The subsoil is mottled, friable silt loam about 23 inches thick. It is mostly dark brown in the upper part and is dark yellowish brown in the lower part. The upper 7 inches of the substratum is dark brown, mottled silt loam. The lower part to a depth of about 60 inches is reddish brown sandy loam. In places cobbles are on the surface.

Included with this soil in mapping are small areas of the well drained Otterholt and Santiago soils. Otterholt soils are in the slightly higher positions on the landscape. Santiago soils have a silty mantle that is thinner than that of the Spencer soil. They are in the higher positions on the landscape. Included soils make up 2 to 10 percent of the unit.

Permeability is moderate in the subsoil of the Spencer soil and moderately slow in the substratum. The available water capacity is high. The organic matter content is moderate in the surface layer. This layer is friable and can be easily tilled, but it tends to crust and puddle after hard rains or if it is tilled when too wet. The depth to the seasonal high water table ranges from 2.5 to 6.0 feet.

Most areas are used as cropland or pasture. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, water erosion is a moderate hazard. It can be controlled by grassed waterways, contour farming, contour stripcropping, and conservation tillage. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazard of erosion.

A cover of pasture plants is effective in controlling erosion. The surface layer is subject to crusting, which restricts the emergence of the plants. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, pasture rotation, measures that improve fertility, and restricted use during wet periods help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be controlled by suitable herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

Because of the wetness and the moderately slow permeability in the substratum, this soil is poorly suited to septic tank absorption fields. Mounding the site with suitable filtering material helps to overcome these limitations. Also, the effluent can be pumped to an absorption field on a better suited soil in some nearby areas.

Because of the slope and the shrink-swell potential, this soil is only moderately suited to dwellings. The slope can be overcome by cutting and filling or by installing retaining walls. Also, the dwellings can be designed so that one side of the basement fronts on the lower part of the slope. The shrink-swell potential can be overcome by excavating the soil and replacing it with coarse textured material, such as sand or gravel; by strengthening the basement walls; and by installing a subsurface drainage system at or below the basement elevation. The wetness is a limitation on sites for dwellings with basements. It can be overcome by installing tile drains around foundations and providing gravity outlets or other dependable outlets and by constructing the foundations on coarse textured fill material above the level of wetness.

Because of low strength and the potential for frost action, this soil is poorly suited to local roads and streets. These limitations can be overcome by replacing the upper part of the soil with coarse textured base material, such as sand or gravel. Low strength also can be overcome by increasing the thickness of the pavement or the base material.

The land capability classification is IIIe. The woodland ordination symbol is 3A.

SsA—Spencer silt loam, gravelly substratum, 0 to 2 percent slopes. This deep, nearly level, moderately well drained soil is on foot slopes on terminal moraines. Individual areas are irregular in shape and generally range from 10 to 80 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 10 inches thick. The subsurface layer is mostly brown silt loam about 4 inches thick. The subsoil is yellowish brown, friable silt loam about 30 inches thick. The upper 6 inches of the substratum is brown, mottled silt loam. The lower part to a depth of about 60 inches is yellowish brown sand and gravel. In places the silty mantle is more than 50 inches thick.

Included with this soil in mapping are small areas of the well drained Antigo and moderately well drained Crystal Lake soils. Antigo soils have a silty mantle that is thinner than that of the Spencer soil. They are in the slightly higher positions on the landscape. Crystal Lake soils are silt loam throughout. They are in the lower positions on the landscape. Included soils make up 5 to 10 percent of the unit.

Permeability is moderate in the upper part of the Spencer soil and rapid or very rapid in the gravelly part of the substratum. The available water capacity is high. The organic matter content is moderate in the surface layer. This layer is friable and can be easily tilled, but it tends to crust and puddle after hard rains or if it is tilled when too wet. The depth to the seasonal high water table ranges from 3 to 6 feet.

Most areas are used as cropland. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Applying a system of conservation tillage and returning crop residue to the soil or adding other organic material help to maintain fertility and good tilth and increase the rate of water infiltration.

This soil is suited to pasture. The surface layer is subject to crusting, which restricts the emergence of the plants. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, measures that improve fertility, and restricted use during wet periods help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

Because of the wetness, this soil is poorly suited to septic tank absorption fields. This limitation can be overcome by mounding the site with suitable filtering material. Also, the effluent can be pumped to an absorption field on a better suited soil in some nearby areas.

This soil is suited to dwellings without basements, but it is only moderately suited to dwellings with basements because of the wetness. This limitation can be overcome by installing tile drains around foundations and providing gravity outlets or other dependable outlets and by constructing the foundations on coarse textured fill material above the level of wetness.

Because of low strength and the potential for frost action, this soil is poorly suited to local roads and streets. These limitations can be overcome by replacing the upper part of the soil with coarse textured base material, such as sand or gravel. Low strength also can be overcome by increasing the thickness of the pavement or the base material.

The land capability classification is I. The woodland ordination symbol is 3A.

SsB—Spencer silt loam, gravelly substratum, 2 to 6 percent slopes. This deep, gently sloping, moderately well drained soil is on foot slopes and knolls on terminal moraines. Individual areas are irregular in shape and generally range from 10 to 160 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 8 inches thick. The subsurface layer is pale brown silt loam about 4 inches thick. The subsoil is friable silt loam about 34 inches thick. It is mostly dark yellowish brown in the upper part and yellowish brown in the lower part. The upper 4 inches of the substratum is yellowish brown, mottled silt loam. The lower part to a depth of about 60 inches is yellowish brown sand and gravel. In places the silty mantle is more than 60 inches thick.

Included with this soil in mapping are small areas of the well drained Antigo and moderately well drained

Spencer soils. Antigo soils have a silty mantle that is thinner than that of the Spencer soil. They are in the slightly higher positions on the landscape. Spencer soils formed in silty deposits over sandy loam. They are in the higher positions on the landscape. Included soils make up 5 to 10 percent of the unit.

Permeability is moderate in the upper part of the Spencer soil and rapid or very rapid in the gravelly part of the substratum. The available water capacity is high. The organic matter content is moderate in the surface layer. This layer is friable and can be easily tilled, but it tends to crust and puddle after hard rains or if it is tilled when too wet. The depth to the seasonal high water table ranges from 3 to 6 feet.

Most areas are used as cropland. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, water erosion is a slight or moderate hazard. It can be controlled by terraces, grassed waterways, contour farming, contour stripcropping, and conservation tillage. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazard of erosion.

A cover of pasture plants is effective in controlling erosion. The surface layer is subject to crusting, which restricts the emergence of the plants. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, pasture rotation, measures that improve fertility, and timely deferment of grazing help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

Because of the wetness, this soil is poorly suited to septic tank absorption fields. This limitation can be overcome by mounding the site with suitable filtering material. Also, the effluent can be pumped to an absorption field on a better suited soil in some nearby areas.

This soil is suited to dwellings without basements, but it is only moderately suited to dwellings with basements because of the wetness. This limitation can be overcome by installing tile drains around foundations and providing gravity outlets or other dependable outlets and by constructing the foundations on coarse textured fill material above the level of wetness.

Because of low strength and the potential for frost action, this soil is poorly suited to local roads and streets. These limitations can be overcome by replacing the upper part of the soil with coarse textured base material, such as sand or gravel. Low strength also can be overcome by increasing the thickness of the pavement or the base material.

The land capability classification is IIe. The woodland ordination symbol is 3A.

TeB—Tell silt loam, 1 to 6 percent slopes. This deep, nearly level and gently sloping, well drained soil is in slightly convex areas on stream terraces and outwash plains. Individual areas are irregular in shape and generally range from 5 to 40 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 9 inches thick. The subsoil is about 24 inches thick. It is dark yellowish brown, friable silt loam in the upper part and yellowish brown, friable sandy loam in the lower part. The substratum to a depth of about 60 inches is yellowish brown sand.

Included with this soil in mapping are small areas of the moderately well drained Meridian soils. These soils are loam in the surface layer and in the upper part of the subsoil. They are in the slightly lower positions on the landscape. They make up 6 to 10 percent of the unit.

Permeability is moderate in the subsoil of the Tell soil and rapid in the substratum. The available water capacity is moderate. The organic matter content is moderately low or moderate in the surface layer. This layer is friable and can be easily tilled, but it tends to crust and puddle after hard rains or if it is tilled when too wet. The rooting depth of most crops is limited by droughtiness in the sandy substratum.

Most areas are used as cropland. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, water erosion is a slight or moderate hazard. It can be controlled by contour farming, contour stripcropping, conservation tillage, and grassed waterways. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazard of erosion.

A cover of pasture plants is effective in controlling erosion. The surface layer is subject to crusting, which restricts the emergence of the plants. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, measures that improve fertility, and restricted use during wet periods help to keep the pasture in good condition.

This soil is suited to trees. The only soil-related management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be controlled by suitable herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

This soil readily absorbs the effluent in septic tank absorption fields. It does not adequately filter the effluent, however, because of the rapid permeability. The poor filtering capacity can result in the pollution of ground water.

This soil is suited to dwellings with basements. It is only moderately suited to dwellings without basements, however, because of the shrink-swell potential. This limitation can be overcome by excavating the soil and replacing it with coarse textured material, such as sand or gravel.

Because of low strength and the potential for frost action, this soil is poorly suited to local roads and streets. These limitations can be overcome by replacing the upper part of the soil with coarse textured base material, such as sand or gravel. Low strength also can be overcome by increasing the thickness of the pavement or the base material.

The land capability classification is IIe. The woodland ordination symbol is 4A.

Ud—Udifluvents, loamy, nearly level. These deep, moderately well drained and somewhat poorly drained soils are in areas on flood plains that commonly are dissected by streams and stream channels. The soils are frequently flooded. Individual areas are long and narrow and generally range from 5 to 40 acres in size.

The soil texture and colors and the thickness of the individual soil layers vary greatly. Typically, the texture is loamy sand, sandy loam, or loam. In places the soils have strata of sand or silt loam.

Included with these soils in mapping are small areas of the poorly drained and very poorly drained Fordum soils. These included soils are in positions on the flood plains similar to those of the Udifluvents. They make up 2 to 15 percent of the unit.

Permeability is moderate to rapid in the Udifluvents. The available water capacity is low. The organic matter content is low in the surface layer.

Most areas are wooded. Some are used as pasture. A few are used as cropland. Because of the frequent flooding and the low available water capacity, these soils are generally not suited to cultivated crops. They are poorly suited to pasture. Establishing or maintaining an improved pasture is difficult because of the flooding. Grazing is limited to periods when the soils are dry. The native vegetation generally is of poor quality for forage.

Because the soil properties vary, managing these soils as woodland is difficult. Competing vegetation interferes with natural regeneration and with the establishment of planted trees. This vegetation can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

These soils generally are not suitable as sites for septic tank absorption fields, dwellings, or local roads and streets, mainly because of the frequent flooding. Overcoming this hazard is difficult. A better suited site should be selected.

The land capability classification is VIs. No woodland ordination symbol is assigned.

Ve—Vesper silt loam, 0 to 2 percent slopes. This deep, nearly level, poorly drained soil is in drainageways on uplands. It is subject to ponding. Individual areas are elongated and generally range from 10 to 60 acres in size.

Typically, the surface layer is very dark gray silt loam about 7 inches thick. The subsurface layer is dark grayish brown silt loam about 5 inches thick. The subsoil is about 26 inches thick. It is mottled. It is dark grayish brown, friable loam in the upper part and olive gray, firm clay loam in the lower part. The substratum to a depth of about 60 inches is grayish brown, stratified sand and loam. In places the surface layer is loam. In some areas a few stones are on the surface. In other areas the slope is more than 2 percent.

Included with this soil in mapping are small areas of the poorly drained Elm Lake and somewhat poorly drained Kert soils. Elm Lake soils are in positions on the landscape similar to those of the Vesper soil. They are underlain by sandstone interbedded with shale. Kert soils are in the slightly higher positions on the landscape. Included soils make up 5 to 10 percent of the unit.

Permeability is moderately slow in the subsoil of the Vesper soil and slow in the substratum. The available water capacity is moderate. The organic matter content is high in the surface layer. The rooting depth of most plants is limited by a seasonal high water table, which is near or above the surface in undrained areas.

Most areas of this soil are used as unimproved pasture. Undrained areas are generally not suited to cultivated crops because of the wetness and the frost hazard. Drained areas are suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. The number of frost-free days per growing season is limited. Planting early maturing crop varieties or growing corn for silage helps to overcome the frost hazard.

This soil is poorly suited to trees. The trees grow so slowly and are so poorly shaped that they are barely merchantable at best. The equipment limitation, seedling mortality, and the windthrow hazard are management concerns. Because of the wetness, hand planting or machine planting on prepared ridges generally is needed if natural regeneration is unreliable. Selection of vigorous nursery stock for planting reduces the seedling mortality rate. Harvesting is frequently limited to periods when the ground is frozen. Harvesting by clearcut or area-selection methods helps to prevent windthrow of the remaining trees. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

This soil generally is not suitable as a site for septic tank absorption fields, dwellings, or local roads and streets, mainly because of the ponding. Overcoming this hazard is difficult. A better suited site should be considered.

The land capability classification is VIw in undrained areas. The woodland ordination symbol is 1W.

Wb—Warman Variant sandy loam, 0 to 2 percent slopes. This deep, nearly level, somewhat poorly drained soil is in shallow depressions and drainageways on outwash plains and stream terraces. Individual areas are irregular in shape and generally range from 5 to 75 acres in size.

Typically, the surface layer is very dark brown sandy loam about 12 inches thick. The subsoil is about 12 inches thick. It is mottled and friable. It is dark reddish brown and brown sandy loam in the upper part and dark brown loamy sand in the lower part. The substratum to a depth of about 60 inches is yellowish brown and dark yellowish brown sand and gravel. In places the surface layer is loam.

Included with this soil in mapping are small areas of the poorly drained and very poorly drained Minocqua soils in depressions. These soils have a loamy mantle that is thicker than that of the Warman Variant soil. They make up 2 to 10 percent of the unit.

Permeability is moderately rapid in the subsoil of the Warman Variant soil and rapid in the substratum. The available water capacity is low. The organic matter content is moderate in the surface layer. This layer is friable and can be easily tilled throughout a wide range of moisture content. The rooting depth of most crops is limited by a seasonal high water table, which is at a depth of 1 to 3 feet in undrained areas.

Most areas are used as cropland. A few are used as pasture. If drained, this soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Excess water can be removed by diversions, grassed waterways, surface drains, and interceptor subsurface drains. If the water table is excessively lowered, however, crop yields in most years are limited by the low available water capacity. If tile drains are installed, the finer sand enters the tile lines unless a suitable filter covers the tile. In areas that are drained and cultivated, soil blowing is a hazard. It can be controlled by wind stripcropping, field windbreaks, and conservation tillage. Returning crop residue to the soil or adding other organic material reduces the hazard of soil blowing and the amount of water lost through evaporation, increases the rate of water infiltration, and helps to maintain fertility.

A cover of pasture plants is effective in controlling soil blowing. Overgrazing can cause surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, measures that improve fertility, and pasture rotation help to keep the pasture in good condition.

This soil is poorly suited to trees. The equipment limitation is the main management concern. The trees grow so slowly and are so poorly formed that they are barely merchantable. Because of the wetness, hand planting or machine planting on prepared ridges generally is needed if natural regeneration is unreliable. Harvesting is frequently limited to periods when the ground is frozen. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

This soil readily absorbs the effluent in septic tank absorption fields. It does not adequately filter the effluent, however, because of the rapid permeability. The poor filtering capacity can result in the pollution of ground water. The wetness also is a limitation. Mounding the site with suitable filtering material helps to overcome the wetness and the poor filtering capacity. Also, the effluent can be pumped to an absorption field on a better suited soil in some nearby areas.

Because of the wetness, this soil is poorly suited to dwellings. This limitation can be overcome by installing tile drains around foundations and providing gravity outlets or other dependable outlets and by constructing the foundations on coarse textured fill material above the level of wetness.

Because of the wetness and the potential for frost action, this soil is only moderately suited to local roads and streets. Installing a subsurface drainage system and replacing the upper part of the soil with coarse textured base material, such as sand or gravel, help to prevent the damage caused by wetness and frost action.

The land capability classification is IIIw. The woodland ordination symbol is 2W.

WeB—Withee silt loam, 1 to 6 percent slopes. This deep, nearly level and gently sloping, somewhat poorly drained soil is in concave areas on ground moraines. Individual areas are irregular in shape and generally range from 10 to 250 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 8 inches thick. The subsurface layer is mostly pale brown, mottled silt loam about 10 inches thick. The subsoil is about 24 inches thick. It is mottled. It is mostly brown, friable silt loam in the upper part and reddish brown, firm loam in the lower part. The substratum to a depth of about 60 inches is reddish brown loam. In places the surface layer is loam or sandy loam. In some areas cobbles are on the surface.

Included with this soil in mapping are small areas of the moderately well drained Loyal and poorly drained and very poorly drained Cable soils. Loyal soils are in the slightly higher positions on the landscape. Cable soils are in depressions and drainageways. Included soils make up 5 to 10 percent of the unit.

Permeability is moderately slow in the Withee soil. The available water capacity is high. The organic matter content is moderate in the surface layer. This layer is friable and can be easily tilled, but it tends to crust and puddle after hard rains or if it is tilled when too wet. The rooting depth of most crops is limited by a seasonal high water table, which is at a depth of 0.5 foot to 2.0 feet in undrained areas.

Most areas are used as cropland. A few are wooded. If drained, this soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If the soil is cultivated, erosion is a slight or moderate hazard. It can be controlled by conservation tillage and grassed waterways. Land smoothing, surface drains, and diversions help to remove excess water. Returning crop residue to the soil or adding other organic material helps to maintain fertility and good tilth, increases the rate of water infiltration, and reduces the hazard of erosion.

A cover of pasture plants is effective in controlling erosion. The surface layer is subject to crusting, which restricts the emergence of the plants. Alfalfa is generally short lived because of the seasonal high water table and the winterkill caused by frost heave. Red clover is generally grown. Overgrazing or grazing when the soil is too wet causes surface compaction, depletion of the plant cover, and an increase in the extent of undesirable plant species. Proper stocking rates, measures that improve fertility, and restricted use during wet periods help to keep the pasture in good condition.

This soil is suited to trees. The equipment limitation and the windthrow hazard are management concerns. Because of the wetness, hand planting or machine planting on prepared ridges generally is needed if natural regeneration is unreliable. Selection of vigorous nursery stock for planting reduces the seedling mortality rate. Harvesting is frequently limited to periods when the ground is frozen. Harvesting by clearcut or area-selection methods helps to prevent windthrow of the remaining trees. Competing vegetation interferes with natural regeneration following harvest. It can be controlled by herbicides or by mechanical removal. Skidding also can destroy competing vegetation and can expose enough mineral soil to allow for rapid natural regeneration.

Because of the wetness and the moderately slow permeability, this soil is poorly suited to septic tank absorption fields. Mounding the site with suitable filtering material helps to overcome these limitations. Also, the effluent can be pumped to an absorption field on a better suited soil in some nearby areas.

Because of the wetness, this soil is poorly suited to dwellings. This limitation can be overcome by constructing foundations on coarse textured fill material above the level of wetness and by installing tile drains around the foundations and providing gravity outlets or other dependable outlets.

Because of the wetness and the potential for frost action, this soil is poorly suited to local roads and streets. Installing a subsurface drainage system and replacing the upper part of the soil with coarse textured base material, such as sand or gravel, help to prevent the damage caused by wetness and frost action.

The land capability classification is IIe. The woodland ordination symbol is 4W.

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is the land that is best suited to food, feed, forage, fiber, and oilseed crops. It may be cultivated land, pasture, woodland, or other land, but it is not urban and built-up land or water areas. It either is used for food or fiber crops or is available for those crops. The soil qualities, growing season, and moisture supply are those needed for a well managed soil to produce a sustained high yield of crops in an economic manner. Prime farmland produces the highest yields with minimal inputs of energy and economic resources, and farming it results in the least damage to the environment.

Prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and growing season are favorable. The level of acidity or alkalinity is acceptable. Prime farmland has few or no rocks and is permeable to water and air. It is not excessively erodible or saturated with water for long periods and is not frequently flooded during the growing season. The slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Soil Conservation Service.

About 275,000 acres in Chippewa County, or more than 40 percent of the land area, is prime farmland. This land is in scattered areas throughout the county, mainly in associations 1, 3, 5, 6, and 7, which are described under the heading "General Soil Map Units." Approximately 175,000 acres of this land is used for crops. The crops grown on this land, mainly corn and alfalfa, account for an estimated two-thirds of the county's total agricultural income each year.

A recent trend in land use in some parts of the county has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

The map units in the survey area that are considered prime farmland are listed in table 5. This list does not constitute a recommendation for a particular land use. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps at the back of this publication. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

Some soils that have a seasonal high water table and all soils that are frequently flooded during the growing season qualify for prime farmland only in areas where these limitations have been overcome by drainage measures or flood control. The need for these measures is indicated after the map unit name in table 5. Onsite evaluation is needed to determine whether or not these limitations have been overcome by corrective measures.

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavior characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds playgrounds, lawns, and trees and shrubs.

Crops and Pasture

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed Soil Map Units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

In 1982, about 422,000 acres of Chippewa County was farmland. About 264,000 acres was used as cropland, 23,800 acres as pasture, and 102,450 acres as woodland. The rest was used for other farm purposes (*15*).

The potential for increased food production in Chippewa County is good. If proper conservation practices are applied, much of the pasture or woodland could be used for food crops. Food production also could be increased considerably by extending the latest crop production technology to all of the cropland in the county. This soil survey can greatly facilitate the application of such technology.

The paragraphs that follow describe main concerns in managing the soils in the county for crops and pasture. These concerns are water erosion, soil blowing, wetness, fertility, and tilth.

Water erosion is the major problem on about 60 percent of the cropland and pasture in the county. It is a hazard on all soils having a slope of 2 percent or more.

Loss of the surface layer through erosion is damaging in at least two ways. First, productivity is reduced as the surface layer is lost and part of the subsurface layer or subsoil is incorporated into the plow layer. The surface layer contains more organic matter than other parts of the soil. Incorporation of material from the subsurface layer or subsoil can result in poor tilth and crusting, which, in turn, can result in poor seed germination or seedling emergence. Second, erosion can result in sedimentation of streams. Control of erosion minimizes this pollution and improves water quality for municipal use, for recreation, and for fish and wildlife.

Erosion-control measures provide a protective ground cover, reduce the runoff rate, and increase the rate of water infiltration. A cropping system that keeps a plant cover on the surface for extended periods can hold soil losses to an amount that does not reduce the productive capacity of the soils. On livestock farms, where pasture and hay are needed, including grasses and legumes in the cropping sequence not only provides nitrogen and improves tilth but also reduces the risk of erosion.

Chisel plowing and other conservation tillage systems that leave crop residue on the surface increase the rate of water infiltration and reduce the hazard of erosion. These systems can be applied on most of the soils in the county.

Terraces and diversions reduce the length of slopes and the risks of erosion and runoff. They are most practical on deep, well drained or moderately well drained, gently sloping or sloping soils. Otterholt and Seaton are examples of soils that are suitable for terracing. Some soils are less well suited to terraces and diversions because they have irregular slopes, are moderately steep, or have sandstone within a depth of 40 inches.

Contour farming and contour stripcropping also help to control erosion in the county (fig. 8). They are best suited to soils that have uniform slopes. Arland, Eleva, Hixton, and Seaton soils are examples.

Soil blowing is a hazard on sandy and loamy soils, such as Billett, Mahtomedi, and Menahga soils, and on the organic Markey soils. It can damage the soils and young plants growing on them in just a few hours if winds are strong and the soils are dry and are not protected by vegetation or surface mulch. Maintaining a cover of plants or surface mulch, wind stripcropping, and establishing field windbreaks minimize soil blowing.

Information about the design of measures that control erosion and soil blowing on each soil in the county is provided in the Technical Guide, which is available in the local office of the Soil Conservation Service.

Wetness is the major management concern on about 20 percent of the acreage used for crops or pasture in

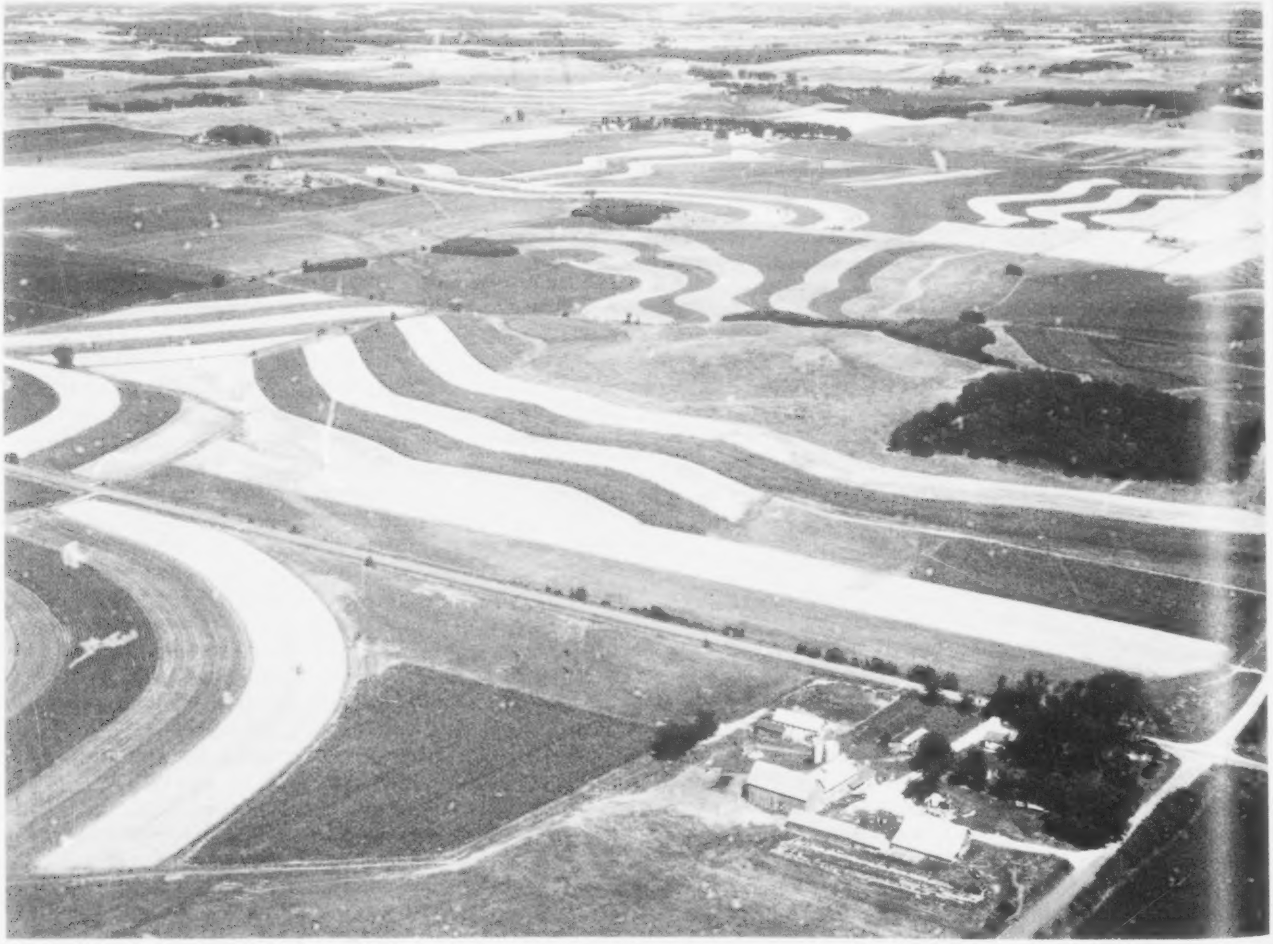

Figure 8.—Contour stripcropping, grassed waterways, and diversions on the moderately steep Seaton and Gale soils.

the county. Some soils are naturally so wet that they generally cannot be used for the crops commonly grown in the county unless they are drained. These are the very poorly drained and poorly drained soils, such as Barronett, Markey, and Rib. Unless drained, Comstock, Magnor, Withee, and other somewhat poorly drained soils are so wet that crops are damaged during most years.

The design of both surface and subsurface drainage systems varies, depending on soil properties and site conditions. A combination of surface and subsurface drains is needed in most areas of the poorly drained and very poorly drained soils used for intensive row cropping. Diversions are needed in some areas to remove runoff from the adjacent fields. In soils that are underlain by stratified silt and very fine sand or fine sand, special covering is needed over the drainage tile. This covering helps to keep substratum material from filling and clogging the tile.

If organic soils are used as cropland, special management measures are necessary. These soils oxidize and subside when water is removed from their pores and the pores are filled with air. Drainage systems that control the depth and period of drainage are needed. Keeping the water table at the level required for crop growth during the growing season and raising it to the surface during other parts of the year minimize the oxidation and subsidence of these soils.

Further information about the design of drainage systems is provided in the Technical Guide, which is available in the local office of the Soil Conservation Service.

Soil fertility varies in the soils of Chippewa County, depending on the cropping history. Most of the soils are naturally acid. Applications of lime are needed to raise the pH of these soils to the level required by the crop to be grown. Available phosphorus and potassium levels are naturally low or medium in most of the soils. On all soils additions of lime or fertilizer should be based on the results of soil tests, the needs of the crop, and the desired level of yields. The Cooperative Extension Service can help in determining the kinds and amounts of fertilizer and lime to be applied.

Soil tilth is an important factor affecting the germination of seeds, the emergence of seedlings, and the infiltration of water into the soils. Soils with good tilth are granular and porous.

Tilling or grazing during wet periods can result in poor tilth, especially on soils that have a surface layer of silt loam. If the soil is bare, a surface crust can form during periods of heavy rainfall. This crust reduces the rate of water infiltration and increases the runoff rate and the hazard of erosion. Maintaining tilth is especially difficult on eroded soils because they have a lower content of organic matter than uneroded soils. Returning crop residue to the soil and regularly adding manure improve tilth and minimize crusting.

Field crops suited to most of the soils and the climate of the county include corn, which is the most commonly grown row crop, and oats, the most common close-grown crop. A limited acreage is used for barley or wheat.

The most commonly grown *hay and pasture* species are mixtures of alfalfa and bromegrass and of red clover and timothy. Bluegrass is the most common native pasture species.

Specialty crops grown commercially in the county are sweet corn, peas, snap beans, kidney beans, sunflowers, ginseng, potatoes, strawberries, raspberries, and apples. Most of the well drained soils are suited to these crops. Soils in low areas where frost is frequent and air drainage is poor generally are poorly suited to early vegetables, small fruits, and orchards. The latest information about growing specialty crops can be obtained from local offices of the Cooperative Extension Service and the Soil Conservation Service.

Yields Per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 6. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of each map unit also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents (*7*). Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 6 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for woodland, and for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit (*13*). Only class and subclass are used in this survey.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e*, ***w***, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; ***w*** shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by ***w***, *s*, or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, woodland, wildlife habitat, or recreation.

The capability classification of each map unit is given in the section "Detailed Soil Map Units" and in the yields table.

Woodland Management and Productivity

George W. Alley, forester, Soil Conservation Service, helped prepare this section.

Before settlement, the entire land area of Chippewa County was forested, except for limited areas of marsh (*5*). The trees have been removed from about two-thirds of the original forest. About 213,900 acres currently is forested. Of this acreage, 211,400 acres is commercial forest. The stands are dominated by the oak-hickory and aspen-birch forest types, each of which covers about 70,000 acres. The other forest types and their acreages are maple-beech-birch, 29,200 acres; conifers, 17,600 acres; and elm-ash-cottonwood, 16,300 acres. About 8,400 acres is nonstocked (*18*).

About 68 percent of the forested acreage occurs as privately owned farm woodlots, 15 percent as county and municipal forests, and 13 percent as privately owned nonfarm woodlots. The rest of the woodland is owned by corporations.

The woodland is protected by a well organized fire-control system. The main management concern probably is the need for removal of defective trees and of the less valuable species. Many of the pine plantations on sandy soils are now old enough to require pruning and thinning (fig. 9). Improved forest management is needed most on the privately owned land.

Table 7 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the ordination symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for an indicator tree species. The number indicates the volume, in cubic meters per hectare per year, which the indicator species can produce. The number 1 indicates low potential productivity; 2 and 3, moderate; 4 and 5, moderately high; 6 to 8, high; 9 to 11, very high; and 12 to 39, extremely high. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *R* indicates steep slopes; *X*, stoniness or rockiness; *W*, excess water in or on the soil; *T*, toxic substances in the soil; *D*, restricted rooting depth; *C*, clay in the upper part of the soil; *S*, sandy texture; and *F*, a high content of rock fragments in the soil. The letter *A* indicates that limitations or restrictions are insignificant. If

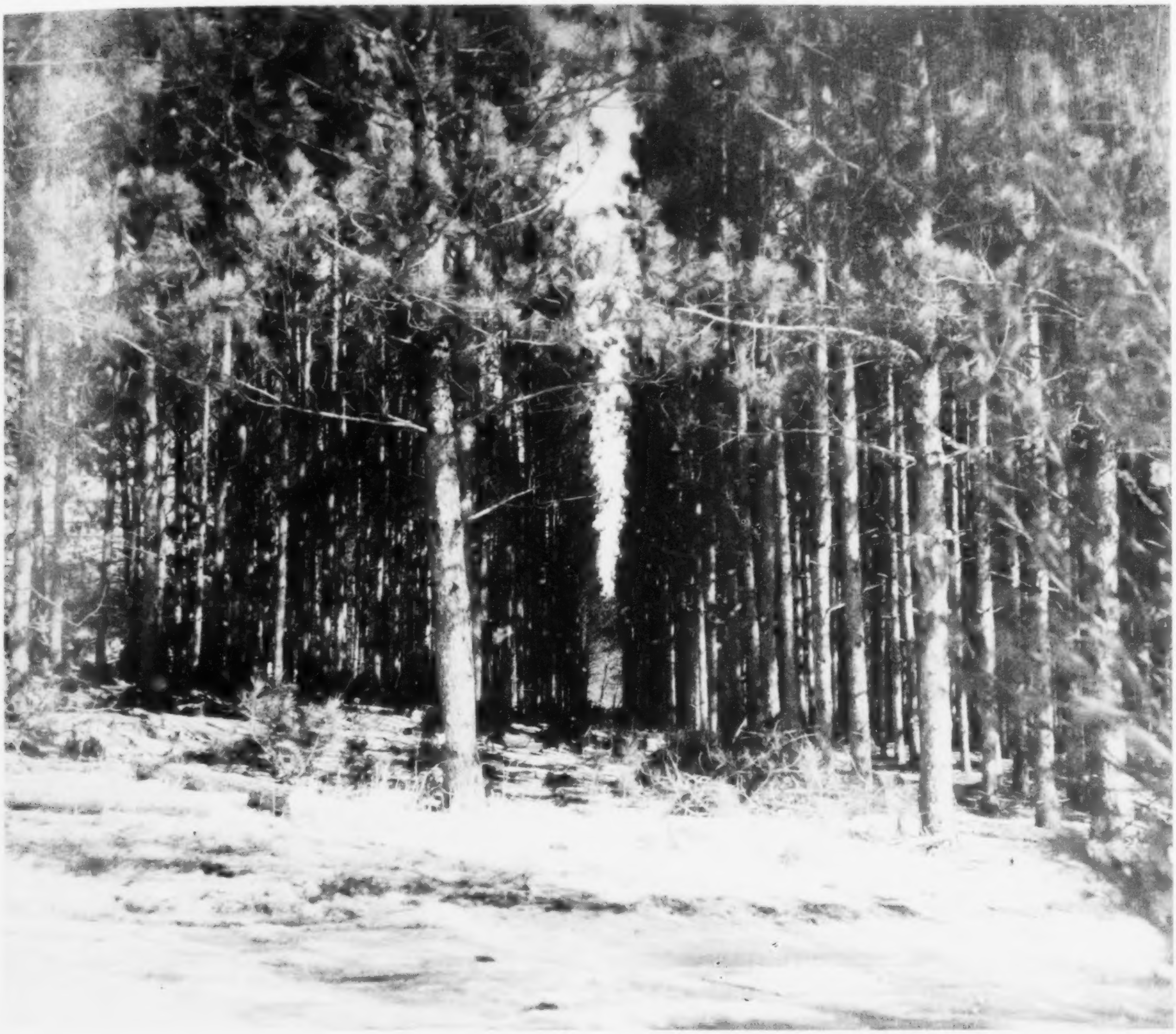

Figure 9.—Red pine plantation in an area of Menahga soils. Stands of pine are thinned for pulpwood and fenceposts. When mature, the remaining trees are used for saw logs.

a soil has more than one limitation, the priority is as follows: R, X, W, T, D, C, S, and F.

In table 7, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Erosion hazard is the probability that damage will occur as a result of site preparation and cutting where the soil is exposed along roads, skid trails, fire lanes, and log-handling areas. Forests that have been burned or overgrazed are also subject to erosion. Ratings of the erosion hazard are based on the percent of the slope. A rating of *slight* indicates that no particular prevention measures are needed under ordinary conditions. A rating of *moderate* indicates that erosion-control measures are needed in certain silvicultural activities. A rating of *severe* indicates that special precautions are needed to control erosion in most silvicultural activities.

Equipment limitation reflects the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. The chief characteristics and conditions considered in the ratings are slope, stones on the surface, rock outcrops, soil wetness, and texture of the surface layer. A rating of *slight* indicates that under normal conditions the kind of equipment or season of use is not significantly restricted by soil factors. Soil wetness can restrict equipment use, but the wet period does not exceed 1 month. A rating of *moderate* indicates that equipment use is moderately restricted because of one or more soil factors. If the soil is wet, the wetness restricts equipment use for a period of 1 to 3 months. A rating of *severe* indicates that equipment use is severely restricted either as to the kind of equipment that can be used or the season of use. If the soil is wet, the wetness restricts equipment use for more than 3 months.

Seedling mortality refers to the death of naturally occurring or planted tree seedlings, as influenced by the kinds of soil, soil wetness, or topographic conditions. The factors used in rating the soils for seedling mortality are texture of the surface layer, depth to a seasonal high water table and the length of the period when the water table is high, rock fragments in the surface layer, effective rooting depth, and slope aspect. A rating of *slight* indicates that seedling mortality is not likely to be a problem under normal conditions. Expected mortality is less than 25 percent. A rating of *moderate* indicates that some problems from seedling mortality can be expected. Extra precautions are advisable. Expected mortality is 25 to 50 percent. A rating of *severe* indicates that seedling mortality is a serious problem. Extra precautions are important. Replanting may be necessary. Expected mortality is more than 50 percent.

Windthrow hazard is the likelihood that trees will be uprooted by the wind because the soil is not deep enough for adequate root anchorage. The main restrictions that affect rooting are a seasonal high water table and the depth to bedrock, a fragipan, or other limiting layers. A rating of *slight* indicates that under normal conditions no trees are blown down by the wind. Strong winds may damage trees, but they do not uproot them. A rating of *moderate* indicates that some trees can be blown down during periods when the soil is wet and winds are moderate or strong. A rating of *severe* indicates that many trees can be blown down during these periods.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index* and as a *volume* number. The site index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

The *volume*, a number, is the yield likely to be produced by the most important trees. This number, expressed as cubic feet per acre per year, indicates the amount of fiber produced on a fully stocked, even-aged, unmanaged stand.

The first species listed under *common trees* for a soil is the indicator species for that soil. It is the dominant species on the soil and the one that determines the ordination class.

Trees to plant are those that are suitable for commercial wood production. Further information about these trees is available in the local office of the Soil Conservation Service. Additional information about woodland management and productivity can be obtained from the Wisconsin Department of Natural Resources, the Soil Conservation Service, or the Cooperative Extension Service.

Windbreaks and Environmental Plantings

Windbreaks protect livestock, buildings, and yards from wind and snow. They also protect fruit trees and gardens, and they furnish habitat for wildlife. Several rows of low- and high-growing broadleaf and coniferous trees and shrubs provide the most protection.

Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field. The interval depends on the erodibility of the soil. Field windbreaks protect cropland and crops from wind, help to keep snow on the fields, and provide food and cover for wildlife.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. To ensure plant survival, a healthy planting stock of suitable species should be planted properly on a well prepared site and maintained in good condition.

Table 8 shows the height that locally grown trees and shrubs are expected to reach in 20 years on various soils. The estimates in table 8 are based on measurements and observation of established plantings that have been given adequate care. They can be used as a guide in planning windbreaks and screens. Additional information on planning windbreaks and screens and planting and caring for trees and shrubs can be obtained from local offices of the Soil Conservation Service, the Wisconsin Department of Natural Resources, or the Cooperative Extension Service or from a commercial nursery.

Recreation

The soils of the survey area are rated in table 9 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 9, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 9 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 12 and interpretations for dwellings without basements and for local roads and streets in table 11.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

Thomas P. Thrall, biologist, Soil Conservation Service, helped prepare this section.

Because of the diverse soils and land uses, Chippewa County has an abundant and varied population of wildlife. The paragraphs that follow specify the kinds of wildlife and wildlife habitat in areas of the associations described under the heading "General Soil Map Units."

The Menahga-Friendship association is a mixture of cropland, nonpastured grassland, woodland, and wetlands. The woodland supports primarily jack pine, red pine, and northern pin oak. The association has many streams and some large wetlands adjacent to the streams. The most common wildlife are red fox, whitetail deer, cottontail rabbit, raccoon, skunk, hawks, and owls. The chief wetland species are mallard, blue-winged teal, beaver, muskrat, mink, and otter.

Much of the Amery-Santiago association is wooded. Some areas, primarily those south of State Highway 64, are farmed. Large acreages of county forests are in this association. The woodland supports northern hardwoods, white birch, and aspen. Many lakes and wooded wetlands increase the diversity of the wildlife habitat. The typical wildlife species include whitetail deer, black bear, ruffed grouse, porcupine, coyote, red fox, snowshoe hare, bobcat, raccoon, squirrels, mink, otter, and beaver. Waterfowl also frequent this association, primarily during their migrations. The farmed areas are inhabited by such species as cottontail rabbit, woodchuck, badger, and skunk.

The Spencer-Magnor-Almena association provides habitat for many wildlife species because it has a good diversity of vegetation, including northern hardwoods and aspen. The association has many acres of county forests. Some large wetlands support shrubs, such as alder and willow, which provide cover for many wildlife species. Also, open wetlands attract waterfowl and muskrats. Areas near Boyd generally are cropped but have wooded corridors and scattered wetlands. The wildlife species are the same as those that inhabit the Amery-Santiago association.

The Elkmound-Plainbo-Eleva, Seaton-Gale, and Kert-Elm Lake-Vesper associations are used mainly for dairy farms. There are a few wetlands and scattered woodlots, some of which are very large. The woodlots support oak and aspen. They provide some good habitat for deer and ruffed grouse. The most common wildlife species are red fox, cottontail rabbit, raccoon, and skunk.

The Billett-Rosholt-Oesterle association is used mainly for dairy farms and cash crops. Some areas are irrigated. The acreage of woodland is smaller than that in the Elkmound-Plainbo-Eleva and Seaton-Gale associations. Some areas have very little plant cover. The chief wildlife species are red fox, cottontail rabbit, raccoon, and skunk. The wildlife population is lower than that in other farmed areas.

The Flambeau-Fallcreek-Withee association generally is wooded. The soils in this association are highly productive sites for northern hardwoods. Some areas are farmed. Streams and wooded wetlands provide good habitat for furbearers. Other wildlife include squirrels, whitetail deer, ruffed grouse, and many other woodland species.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 10, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are timothy, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are curly dock, goldenrod, smartweed, and ragweed.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, poplar, cherry, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are dogwood, highbush cranberry, and crabapple.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, cedar, and juniper.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, wildrice, cordgrass, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds (fig. 10).

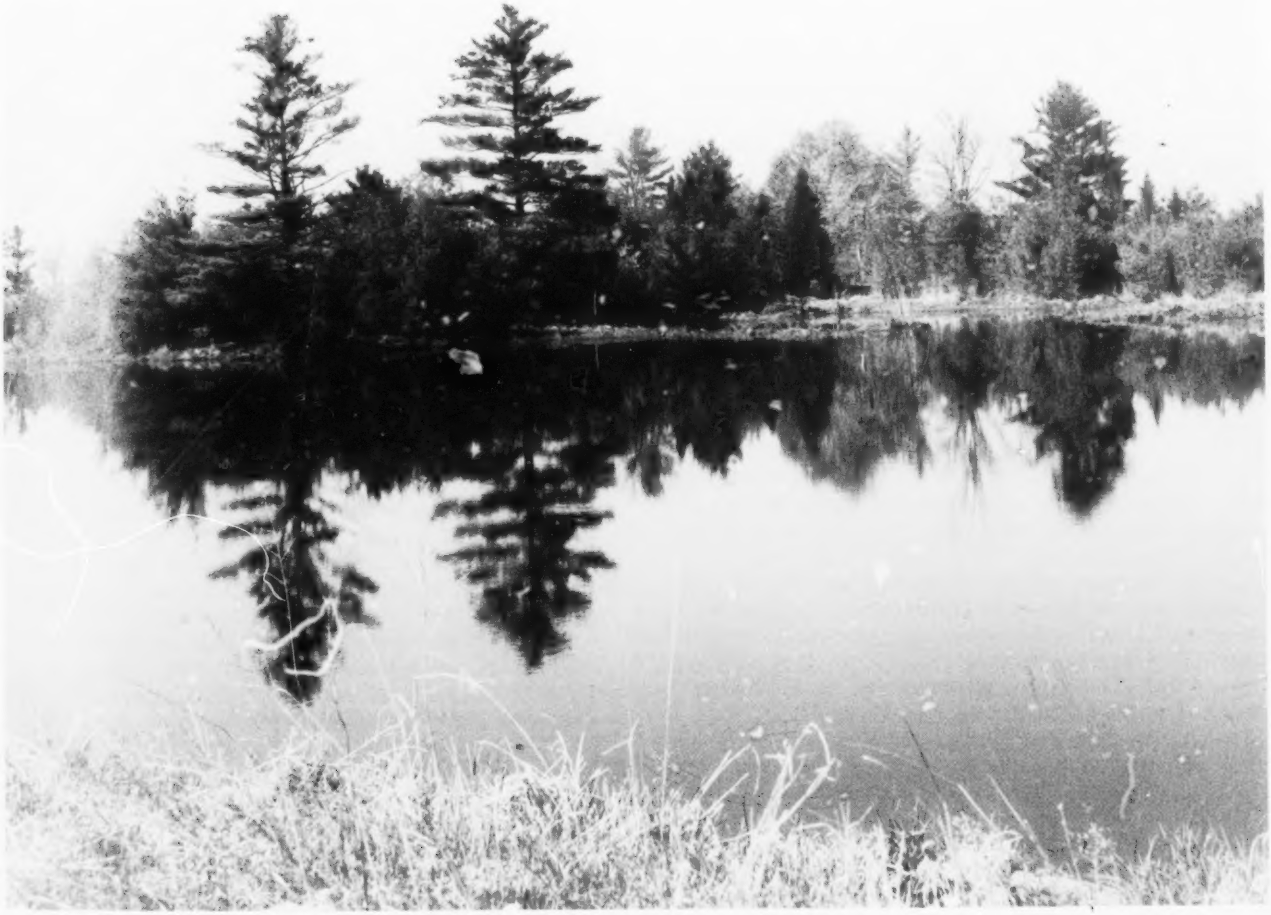

Figure 10.—A wildlife pond in an area of Cable soils.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include red-tailed hawk, bobolink, meadowlark, field sparrow, cottontail rabbit, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, deer, and bear.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, and beaver.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations need to be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to (1) evaluate the potential of areas for residential, commercial, industrial, and recreation uses; (2) make preliminary estimates of construction conditions; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; (5) plan detailed onsite investigations of soils and geology; (6) locate potential sources of gravel, sand, earthfill, and topsoil; (7) plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and (8) predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 11 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock or a very firm dense layer, stone content, soil texture, and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock, large stones, slope, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock, the available water capacity in the upper 40 inches, and the content of salts affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 12 shows the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 12 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock, and flooding affect absorption of the effluent. Large stones and bedrock interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 12 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock, flooding, large stones, and content of organic matter.

Excessive seepage due to rapid permeability of the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope and bedrock can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 12 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 13 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 13, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 14 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and for embankments, dikes, and levees. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts. A high water table affects the amount of usable material. It also affects trafficability.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and potential frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock. The performance of a system is affected by the depth of the root zone, the amount of salts, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to reduce erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of soil blowing or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock affect the construction of grassed waterways. A hazard of soil blowing, low available water capacity, restricted rooting depth, toxic substances such as salts, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics. These results are reported in table 18.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 15 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter (fig. 11). "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as about 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

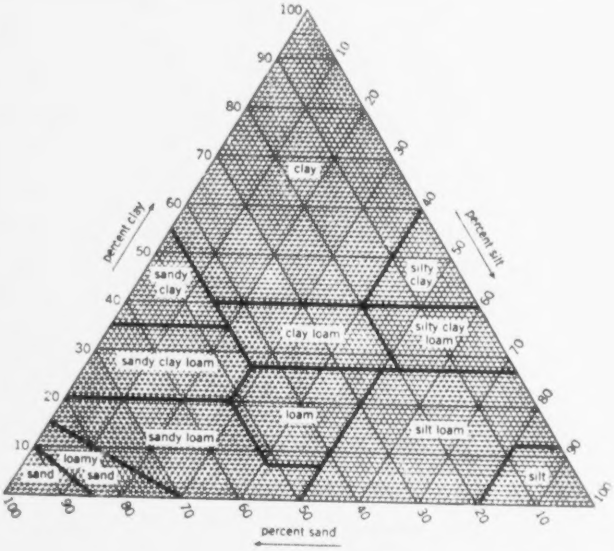

Figure 11.—Percentages of clay, silt, and sand in the basic USDA soil textural classes.

Classification of the soils is determined according to the Unified soil classification system (*2*) and the system adopted by the American Association of State Highway and Transportation Officials (*1*).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest. The AASHTO classification for soils tested, with group index numbers in parentheses, is given in table 18.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 16 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, and plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3 bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to soil blowing in cultivated areas. The groups indicate the susceptibility to soil blowing. Soils are grouped according to the following distinctions:

1. Sands, coarse sands, fine sands, and very fine sands. These soils are generally not suitable for crops. They are extremely erodible, and vegetation is difficult to establish.

2. Loamy sands, loamy fine sands, and loamy very fine sands. These soils are very highly erodible. Crops can be grown if intensive measures to control soil blowing are used.

3. Sandy loams, coarse sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible. Crops can be grown if intensive measures to control soil blowing are used.

4L. Calcareous loamy soils that are less than 35 percent clay and more than 5 percent finely divided calcium carbonate. These soils are erodible. Crops can be grown if intensive measures to control soil blowing are used.

4. Clays, silty clays, clay loams, and silty clay loams that are more than 35 percent clay. These soils are moderately erodible. Crops can be grown if measures to control soil blowing are used.

5. Loamy soils that are less than 20 percent clay and less than 5 percent finely divided calcium carbonate and sandy clay loams and sandy clays that are less than 5 percent finely divided calcium carbonate. These soils are slightly erodible. Crops can be grown if measures to control soil blowing are used.

6. Loamy soils that are 20 to 35 percent clay and less than 5 percent finely divided calcium carbonate, except silty clay loams. These soils are very slightly erodible. Crops can easily be grown.

7. Silty clay loams that are less than 35 percent clay and less than 5 percent finely divided calcium carbonate. These soils are very slightly erodible. Crops can easily be grown.

8. Stony or gravelly soils and other soils not subject to soil blowing.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 16, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter of a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 17 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to two hydrologic groups in table 17, the first letter is for drained areas and the second is for undrained areas.

Flooding, the temporary inundation of an area, is caused by overflowing streams or by runoff from adjacent slopes. Water standing for short periods after rainfall or snowmelt is not considered flooding, nor is water in swamps and marshes.

Table 17 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *occasional* that it occurs, on the average, once or less in 2 years; and *frequent* that it occurs, on the average, more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; November-May, for example, means that flooding can occur during the period November through May.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons that form in soils that are not subject to flooding.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 17 are the depth to the seasonal high water table; the kind of water table—that is, perched or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 17.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Only saturated zones within a depth of about 6 feet are indicated. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water rises above the surface. The second numeral indicates the depth below the surface.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Subsidence is the settlement of organic soils or of saturated mineral soils of very low density. Subsidence results from either desiccation and shrinkage or oxidation of organic material, or both, following drainage. Subsidence takes place gradually, usually over a period of several years. Table 17 shows the total subsidence, which usually is a result of oxidation.

Not shown in the table is subsidence caused by an imposed surface load or by the withdrawal of ground water throughout an extensive area as a result of lowering the water table.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage mainly to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severe corrosion environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Engineering Index Test Data

Table 18 shows laboratory test data for several pedons sampled at carefully selected sites in the survey area. The pedons are representative of the series described in the section "Soil Series and Their Morphology." The soil samples were tested by the Wisconsin Department of Transportation, Division of Highways and Transportation Facilities.

The testing methods generally are those of the American Association of State Highway and Transportation Officials (AASHTO) or the American Society for Testing and Materials (ASTM).

The tests and methods are AASHTO classification—M 145 (AASHTO), D 3282 (ASTM); Unified classification—D 2487 (ASTM); Mechanical analysis—T 88 (AASHTO), D 2217 (ASTM); Liquid limit—T 89 (AASHTO), D 423 (ASTM); Plasticity index—T 90 (AASHTO), D 424 (ASTM); and Moisture density, Method A—T 99 (AASHTO), D 698 (ASTM).

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (*14*). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 19 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Entisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aquent (*Aqu*, meaning water, plus *ent*, from Entisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Haplaquents (*Hapl*, meaning minimal horizonation, plus *aquent*, the suborder of the Entisols that has an aquic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Haplaquents.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is sandy over loamy, mixed, acid, frigid Typic Haplaquents.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the *Soil Survey Manual* (*12*). Many of the technical terms used in the descriptions are defined in *Soil Taxonomy* (*14*). Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Alban Series

The Alban series consists of deep, well drained and moderately well drained, moderately permeable soils on glacial lake plains and terraces. These soils formed in loamy lacustrine deposits. Slope ranges from 2 to 12 percent.

Typical pedon of Alban fine sandy loam, 2 to 6 percent slopes, 1,950 feet south and 100 feet west of the center of sec. 2, T. 32 N., R. 6 W.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) fine sandy loam, light brownish gray (10YR 6/2) dry; weak fine subangular blocky structure; friable; medium acid; abrupt smooth boundary.

E—8 to 12 inches; brown (10YR 5/3) fine sandy loam, very pale brown (10YR 7/3) dry; weak medium platy structure; very friable; slightly acid; clear wavy boundary.

E/B—12 to 18 inches; brown (10YR 5/3) fine sandy loam, very pale brown (10YR 7/3) dry (E); weak medium platy structure; E material makes up about 60 percent of the horizon; dark brown (7.5YR 4/4) fine sandy loam (Bt); weak thick platy structure parting to weak very fine subangular blocky; very friable; slightly acid; clear wavy boundary.

B/E—18 to 24 inches; dark brown (7.5YR 4/4) fine sandy loam (Bt); weak fine subangular blocky structure; Bt material makes up about 70 percent of the horizon; brown (10YR 5/3) fine sandy loam, very pale brown (10YR 7/3) dry (E); weak thick platy structure; very friable; thin patchy clay films on faces of peds; slightly acid; clear wavy boundary.

Bt—24 to 34 inches; dark brown (7.5YR 4/4) very fine sandy loam; common medium distinct strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure; friable; few distinct patchy clay films on faces of peds; light gray (10YR 7/2) uncoated silt particles and very fine sand grains on vertical faces of peds; slightly acid; clear wavy boundary.

BC—34 to 38 inches; dark brown (7.5YR 4/4) fine sandy loam; common medium distinct strong brown (7.5YR 4/6) mottles; weak very thick platy structure parting to weak medium subangular blocky; very friable; medium acid; clear smooth boundary.

C—38 to 60 inches; brown (7.5YR 5/4) stratified silt, very fine sand, and fine sand; tends to part as weak very thick plates along textural strata; very friable; medium acid.

The thickness of the solum ranges from 25 to 54 inches. The Ap or A horizon has value of 2 to 4 and chroma of 1 to 3. The E horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 or 3. It is fine sandy loam, loam, or silt loam. The Bt and BC horizons have hue of 5YR, 7.5YR, or 10YR, value of 4 or 5, and chroma of 3 to 6. They are fine sandy loam, very fine sandy loam, loam, or silt loam. The C horizon has hue of 5YR, 7.5YR, or 10YR and value and chroma of 4 to 6. It is dominantly stratified fine sand, very fine sand, and silt, but some pedons have strata of loamy fine sand, fine sandy loam, or silt loam.

Almena Series

The Almena series consists of deep, somewhat poorly drained soils on ground moraines. These soils formed in silty deposits over gravelly sandy loam glacial till. Permeability is moderately slow or moderate in the subsoil and moderately slow in the substratum. Slope ranges from 1 to 6 percent.

Typical pedon of Almena silt loam, 1 to 6 percent slopes, 450 feet south and 1,100 feet east of the northwest corner of sec. 16, T. 29 N., R. 6 W.

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak medium subangular blocky structure; friable; neutral; abrupt smooth boundary.

E—9 to 14 inches; grayish brown (10YR 5/2) silt loam; common medium prominent dark brown (7.5YR 4/4) mottles; weak medium platy structure; friable; medium acid; clear irregular boundary.

E/B—14 to 18 inches; grayish brown (10YR 5/2) silt loam (E); weak medium platy structure; E material makes up about 60 percent of the horizon; dark brown (7.5YR 4/4) silt loam (Bt); common medium distinct strong brown (7.5YR 5/6) and common medium prominent grayish brown (10YR 5/2) mottles; weak medium subangular blocky structure; friable; very strongly acid; clear irregular boundary.

B/E—18 to 24 inches; dark brown (7.5YR 4/4) silt loam (Bt); common medium distinct strong brown (7.5YR 5/6) and common medium prominent grayish brown (10YR 5/2) mottles; weak medium subangular blocky structure; Bt material makes up about 80 percent of the horizon; grayish brown (10YR 5/2) silt loam (E); weak medium platy structure; friable; very strongly acid; clear irregular boundary.

Bt1—24 to 36 inches; dark brown (7.5YR 4/4) silt loam; common medium prominent grayish brown (10YR 5/2) mottles; moderate medium subangular blocky structure; friable; light gray (10YR 7/2) uncoated silt particles on faces of peds and in root channels; common distinct continuous clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt2—36 to 42 inches; dark brown (7.5YR 4/4) silt loam; many medium prominent grayish brown (10YR 5/2) mottles; moderate medium subangular blocky structure; friable; light gray (10YR 7/2) uncoated silt particles on faces of peds and in root channels; few distinct patchy clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt3—42 to 48 inches; dark brown (7.5YR 4/4) silt loam; many medium prominent grayish brown (10YR 5/2) mottles; weak coarse subangular blocky structure; friable; few faint patchy clay films on faces of peds; very strongly acid; clear smooth boundary.

2C—48 to 60 inches; reddish brown (5YR 4/4) gravelly sandy loam; massive; friable; estimated 20 percent gravel; medium acid.

The thickness of the solum ranges from 30 to 48 inches. The thickness of the silty mantle ranges from 30 to 60 inches.

The Ap horizon has value of 4 or 5 and chroma of 2 or 3. Some pedons have an A horizon, which has value and chroma of 2 or 3. The E horizon has value of 4 to 6 and chroma of 2 or 3. It is silt or silt loam. The Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 to 4. It is silt loam or silty clay loam. The 2C horizon has value and chroma of 4 to 6. It is gravelly loam, gravelly sandy loam, or sandy loam. The content of gravel in this horizon is 15 to 20 percent.

Amery Series

The Amery series consists of deep, well drained soils on moraines. These soils formed in loamy deposits and in the underlying loamy sand or sandy loam glacial till (fig. 12). Permeability is moderately slow or moderate. Slope ranges from 2 to 45 percent.

The Amery soils in this county are taxadjuncts to the series because the increase in clay content between the surface soil and the subsoil is slightly less than is required for an argillic horizon. This difference, however, does not alter the usefulness or behavior of the soils.

Typical pedon of Amery sandy loam, 12 to 25 percent slopes, 800 feet west and 1,600 feet south of the northeast corner of sec. 36, T. 32 N., R. 9 W.

A—0 to 2 inches; very dark gray (10YR 3/1) sandy loam, gray (10YR 5/1) dry; weak fine granular structure; friable; estimated 5 percent pebbles; very strongly acid; clear smooth boundary.

E—2 to 11 inches; brown (7.5YR 5/4) sandy loam, pinkish gray (7.5YR 7/2) dry; weak thin platy structure; friable; estimated 5 percent gravel; medium acid; clear wavy boundary.

B/E—11 to 22 inches; reddish brown (5YR 4/4) sandy loam (Bt); weak fine subangular blocky structure; Bt material makes up about 60 percent of the horizon; dark brown (7.5YR 4/4) sandy loam (E); weak thin platy structure; friable; estimated 5 percent gravel; thin patchy clay films on faces of peds; medium acid; clear wavy boundary.

Bt1—22 to 29 inches; reddish brown (5YR 4/4) sandy loam; weak medium subangular blocky structure; friable; few faint patchy clay films on faces of peds; estimated 15 percent gravel; medium acid; clear wavy boundary.

Bt2—29 to 32 inches; reddish brown (5YR 4/4) sandy loam; weak coarse subangular blocky structure; friable; few faint patchy clay films on faces of peds; estimated 10 percent gravel and 5 percent cobbles; medium acid; clear wavy boundary.

C—32 to 60 inches; reddish brown (5YR 4/4) loamy sand; massive; friable; estimated 10 percent gravel and 5 percent cobbles; slightly acid.

The thickness of the solum ranges from 30 to 50 inches. The content of gravel and cobbles ranges from 8 to 15 percent throughout the profile.

The Ap or A horizon has value of 2 to 4 and chroma of 1 to 3. The E horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 2 to 4. The Bt horizon has hue of 2.5YR, 5YR, or 7.5YR and value and chroma of 3 to 5. It is loam, sandy loam, or gravelly sandy loam. The C horizon has hue of 2.5YR, 5YR, or 7.5YR and value and chroma of 3 to 6. It is sandy loam, gravelly sandy loam, loamy sand, or gravelly loamy sand.

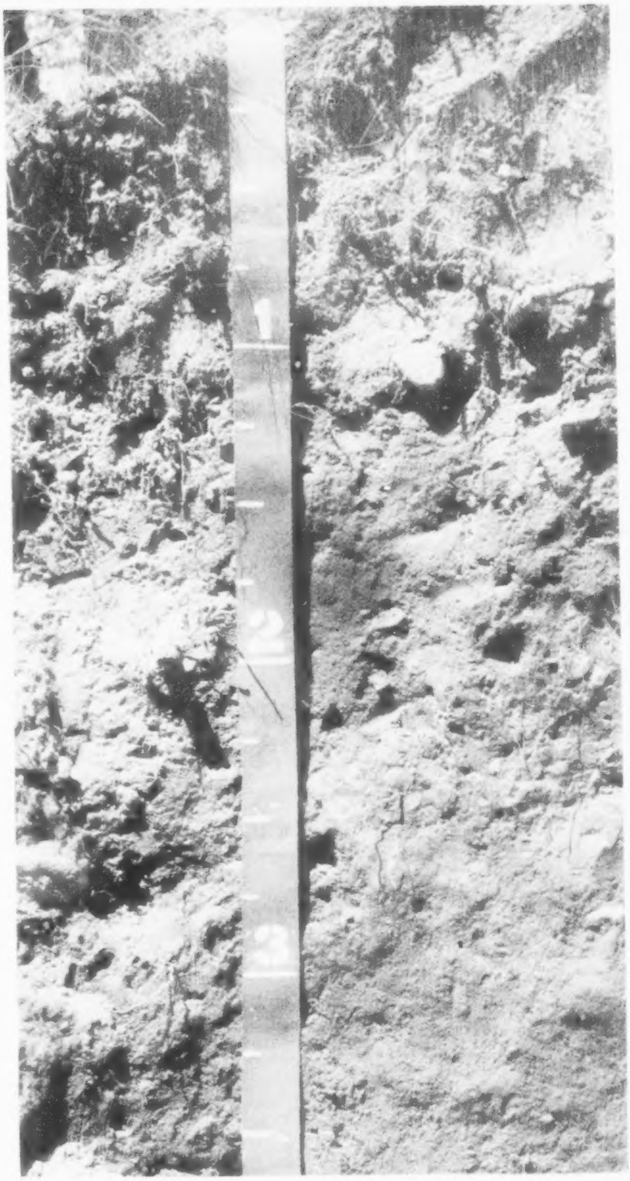

Figure 12.—Profile of an Amery soil. Sandy or loamy glacial till is at a depth of about 32 inches. Depth is marked in feet.

Antigo Series

The Antigo series consists of deep, well drained soils on outwash plains and stream terraces. These soils formed in silty and loamy deposits underlain by stratified sand and gravel. Permeability is moderate in the subsoil and rapid or very rapid in the substratum. Slope ranges from 1 to 12 percent.

Typical pedon of Antigo silt loam, 1 to 6 percent slopes, 925 feet south and 400 feet west of the northeast corner of sec. 35, T. 29 N., R. 5 W.

Ap—0 to 10 inches; very dark grayish brown (10YR 3/2) silt loam, light gray (10YR 7/2) dry; moderate medium and fine granular structure; friable; slightly acid; abrupt smooth boundary.

E—10 to 13 inches; brown (10YR 5/3) silt loam, very pale brown (10YR 7/3) dry; moderate medium platy structure; friable; medium acid; clear smooth boundary.

E/B—13 to 16 inches; brown (10YR 5/3) silt loam (E); moderate medium platy structure; E material makes up about 60 percent of the horizon; dark yellowish brown (10YR 4/4) silt loam (Bt); moderate medium subangular blocky structure; friable; very strongly acid; clear wavy boundary.

B/E—16 to 20 inches; dark yellowish brown (10YR 4/4) silt loam (Bt); moderate medium subangular blocky structure; Bt material makes up about 70 percent of the horizon; brown (10YR 5/3) silt loam (E); weak medium platy structure; friable; thin patchy clay films on faces of peds; very strongly acid; clear wavy boundary.

Bt1—20 to 25 inches, dark yellowish brown (10YR 4/4) silt loam; moderate medium subangular blocky structure; friable; common distinct clay films on faces of peds; light gray (10YR 7/2) uncoated silt particles on vertical faces of peds; very strongly acid; clear wavy boundary.

Bt2—25 to 28 inches; dark brown (7.5YR 4/4) silt loam; moderate medium subangular blocky structure; friable; common distinct clay films on faces of peds; very strongly acid; clear wavy boundary.

2Bt3—28 to 32 inches; reddish brown (5YR 4/4) sandy loam; moderate medium subangular blocky structure; friable; few faint clay films on faces of peds; very strongly acid; abrupt smooth boundary.

2C—32 to 60 inches; brown (7.5YR 5/4) stratified sand and gravel; single grain; loose; strongly acid.

The thickness of the solum ranges from 22 to 40 inches. The thickness of the silty mantle ranges from 20 to 36 inches.

The Ap horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 or 3. The E horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 2 or 3. The Bt horizon has hue of 7.5YR or 10YR and value and chroma of 4 or 5. The 2Bt and 2C horizons have hue of 5YR. 7.5YR, or 10YR and value and chroma of 4 to 6. The 2Bt horizon is gravelly loamy sand, gravelly sandy loam, sandy loam, or loam. The 2C horizon is stratified sand and gravel or is gravelly sand.

Arenzville Series

The Arenzville series consists of deep, moderately well drained, moderately permeable soils on flood plains. These soils formed in silty deposits. Slope ranges from 0 to 3 percent.

Typical pedon of Arenzville silt loam, 0 to 3 percent slopes, 1,150 feet south and 75 feet west of the northeast corner of sec. 12, T. 29 N., R. 10 W.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; moderate fine subangular blocky structure; friable; medium acid; abrupt smooth boundary

C—8 to 38 inches; stratified brown (10YR 5/3), dark grayish brown (10YR 4/2), and very dark grayish brown (10YR 3/2) silt loam; weak thin plates; friable; medium acid; abrupt smooth boundary.

Ab—38 to 50 inches; very dark gray (10YR 3/1) silt loam; weak medium granular structure; friable; medium acid; clear smooth boundary.

C'—50 to 60 inches; dark grayish brown (10YR 4/2) silt loam; common medium distinct dark brown (7.5YR 4/4) mottles; weak thick plates; friable; medium acid.

The depth to the Ab horizon ranges from 20 to 40 inches. The Ap horizon has value of 3 to 5 and chroma of 1 to 3. The C horizon has value of 3 to 5 and chroma of 2 or 3. The Ab horizon has value of 2 or 3 and chroma of 1 or 2. The C' horizon has value of 4 to 6 and chroma of 1 or 2. It is either silt loam or is silt loam that has thin strata of coarser textured material.

Arland Series

The Arland series consists of moderately deep, well drained soils on uplands. These soils formed in loamy glacial till underlain by sandy residuum and sandstone. Permeability is moderate in the upper part of the subsoil and moderately rapid in the substratum. Slope ranges from 2 to 20 percent.

Typical pedon of Arland sandy loam, 6 to 12 percent slopes, eroded, 1,200 feet south and 275 feet west of the northeast corner of sec. 3, T. 31 N., R. 10 W.

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) sandy loam, light brownish gray (10YR 6/2) dry; weak medium subangular blocky structure; friable; slightly acid; abrupt smooth boundary.

Bt1—7 to 11 inches; dark brown (7.5YR 4/4) sandy loam; weak medium subangular blocky structure;

friable; few distinct discontinuous clay films on faces of peds; slightly acid; clear wavy boundary.

Bt2—11 to 25 inches; dark brown (7.5YR 4/4) loam; moderate medium subangular blocky structure; friable; common distinct discontinuous clay films on faces of peds; slightly acid; clear smooth boundary.

BC—25 to 29 inches; dark brown (7.5YR 4/4) sandy loam; weak medium subangular blocky structure; friable; slightly acid; clear smooth boundary.

2C—29 to 35 inches; reddish yellow (7.5YR 6/6) sand; single grain; loose; strongly acid; clear smooth boundary.

2Cr—35 to 60 inches; reddish yellow (7.5YR 6/6), poorly cemented sandstone.

The thickness of the solum ranges from 20 to 36 inches. The depth to sandstone ranges from 30 to 40 inches.

The Ap or A horizon has value of 3 or 4 and chroma of 2 or 3. It is sandy loam or loam. The Bt horizon has hue of 5YR, 7.5YR, or 10YR, value of 4 or 5, and chroma of 3 or 4. It is sandy loam, fine sandy loam, or loam. The BC horizon has hue of 5YR, 7.5YR, or 10YR and value and chroma of 4 to 6. It is loamy sand, sandy loam, or fine sandy loam. The 2C horizon has value of 5 to 8 and chroma of 2 to 6. It is loamy sand, loamy fine sand, or sand.

Auburndale Series

The Auburndale series consists of deep, poorly drained soils on ground moraines. These soils formed in silty deposits and in the underlying sandy loam glacial till. Permeability is moderately slow or moderate in the subsoil and moderate in the substratum. Slope ranges from 0 to 2 percent.

Typical pedon of Auburndale silt loam, 0 to 2 percent slopes, 350 feet north and 500 feet west of the southeast corner of sec. 3, T. 29 N., R. 6 W.

Ap—0 to 6 inches; very dark gray (10YR 3/1) silt loam, light brownish gray (10YR 6/2) dry; weak medium subangular blocky structure; friable; strongly acid; abrupt smooth boundary.

E1—6 to 11 inches; light brownish gray (10YR 6/2) silt loam; few fine prominent strong brown (7.5YR 5/6) mottles; weak thin platy structure; friable; strongly acid; clear wavy boundary.

E2—11 to 16 inches; grayish brown (10YR 5/2) silt loam; common medium distinct dark brown (7.5YR 4/4) mottles; weak medium platy structure; friable; strongly acid; clear wavy boundary.

B/E—16 to 22 inches; grayish brown (10YR 5/2) silt loam (Bt); common medium distinct brown (7.5YR 5/4) and dark brown (7.5YR 4/4) and many medium prominent strong brown (7.5YR 5/8) mottles; weak fine subangular blocky structure; Bt material makes up about 60 percent of the horizon; few faint patchy clay films on faces of peds; light brownish gray (10YR 6/2) silt loam (E); weak medium platy structure; friable; strongly acid; clear wavy boundary.

Btg1—22 to 34 inches; gray (10YR 5/1) silt loam; common medium prominent strong brown (7.5YR 5/8) and yellowish red (5YR 5/8) mottles; moderate fine subangular blocky structure; friable; few faint discontinuous clay films on faces of peds; very strongly acid; clear wavy boundary.

Btg2—34 to 38 inches; brown (7.5YR 5/2) silt loam; many coarse prominent strong brown (7.5YR 5/8) and yellowish red (5YR 5/8) mottles; moderate fine subangular blocky structure; friable; few faint discontinuous clay films on faces of peds; strongly acid; clear wavy boundary.

2BC—38 to 45 inches; dark reddish brown (5YR 3/4) loam; common coarse distinct brown (7.5YR 5/2) mottles; weak medium subangular blocky structure; friable; strongly acid; gradual smooth boundary.

2C—45 to 60 inches; reddish brown (5YR 4/4) sandy loam; massive; friable; estimated 5 percent gravel; strongly acid.

The thickness of the solum ranges from 30 to 48 inches. The thickness of the silty mantle ranges from 30 to 60 inches.

The Ap or A horizon has value of 3 to 5 and chroma of 1 or 2. The Btg horizon has hue of 7.5YR, 10YR, or 2.5Y or is neutral in hue. It has value of 4 to 6 and chroma of 0 to 2. The 2BC horizon is loam or sandy loam. The content of gravel in this horizon is as much as 15 percent. The 2C horizon has hue of 2.5YR or 5YR and value of 3 to 6. It is sandy loam, loam, or gravelly sandy loam. The content of gravel in this horizon ranges from 5 to 25 percent.

Barronett Series

The Barronett series consists of deep, poorly drained and very poorly drained soils on glacial lake plains. These soils formed in silty lacustrine deposits underlain by stratified silty and sandy deposits. Permeability is moderately slow or moderate. Slope ranges from 0 to 2 percent.

Typical pedon of Barronett silt loam, 0 to 2 percent slopes, 1,200 feet north and 520 feet west of the southeast corner of sec. 21, T. 31 N., R. 6 W.

Ap—0 to 9 inches; very dark gray (10YR 3/1) silt loam, dark gray (10YR 4/1) dry; few fine prominent dark brown (7.5YR 4/4) and yellowish red (5YR 5/8) mottles; weak thick platy structure parting to weak fine subangular blocky; friable; medium acid; abrupt smooth boundary.

E1—9 to 12 inches; dark gray (10YR 4/1) silt loam, gray (10YR 5/1) dry; few fine prominent dark brown (7.5YR 4/4) mottles; moderate medium and thick platy structure; friable; strongly acid; clear wavy boundary.

E2—12 to 18 inches; grayish brown (10YR 5/2) silt loam; many medium prominent strong brown (7.5YR 5/8) mottles; moderate medium platy structure parting to weak very fine subangular blocky; friable; strongly acid; clear smooth boundary.

Btg1—18 to 30 inches; gray (5Y 6/1) silt loam; many medium prominent strong brown (7.5YR 5/6) and yellowish red (5YR 5/6) mottles; weak thick platy structure parting to weak fine subangular blocky; friable; few distinct clay films in some pores; medium acid; clear smooth boundary.

Btg2—30 to 40 inches; gray (5Y 6/1) and pinkish gray (5YR 6/2) silt loam; few medium prominent strong brown (7.5YR 5/6 and 5/8) mottles; weak very thick platy structure parting to weak medium subangular blocky; friable; strong brown (5/8) organic coatings and iron stains in root channels and on vertical faces of peds; medium acid; clear smooth boundary.

Cg—40 to 60 inches; gray (10YR 6/1) silt loam that has thin strata of very fine sand; many coarse prominent strong brown (7.5YR 5/6 and 5/8) mottles; weak thick plates related to textural strata; friable; neutral.

The thickness of the solum ranges from 30 to 42 inches. The Ap or A horizon has hue of 10YR or 2.5Y, value of 2 or 3, and chroma of 1 or 2. It is silt loam or mucky silt loam. The E horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 or 2. The Btg horizon has hue of 10YR, 2.5Y, or 5Y value of 4 to 6, and chroma of 1 or 2. It is silt loam or silty clay loam. The Cg horizon has hue of 5YR, 7.5YR, 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 1 to 3. It occurs as strata of silt loam, loam, very fine sandy loam, fine sand, or very fine sand.

Beseman Series

The Beseman series consists of deep, very poorly drained soils in depressions on ground moraines. These soils formed in highly decomposed organic material underlain by silty or loamy deposits. Permeability is moderately rapid in the organic layers and moderately slow in the substratum. Slope is 0 to 1 percent.

Typical pedon of Beseman muck, 0 to 1 percent slopes, 1,150 feet north and 1,320 feet east of the southwest corner of sec. 7, T. 32 N., R. 8 W.

Oe—0 to 2 inches; hemic material, brown (7.5YR 5/4) broken face, pressed, and rubbed; about 75 percent fiber, 35 percent rubbed; massive; nonsticky; primarily sphagnum moss; extremely acid (pH 4.3 in water); clear wavy boundary.

Oa1—2 to 8 inches; sapric material, dark brown (7.5YR 3/2) broken face, pressed, and rubbed; about 15 percent fiber, 2 percent rubbed; massive; slightly sticky; less than 2 percent mineral material; herbaceous fiber; extremely acid (pH 4.6 in water); clear smooth boundary.

Oa2—8 to 20 inches; sapric material, black (10YR 2/1) broken face, pressed, and rubbed; about 10 percent fiber, a trace rubbed; massive; slightly sticky; about 5 percent silt; herbaceous fiber; extremely acid (pH 4.4 in water); abrupt smooth boundary.

Cg—20 to 60 inches; gray (5Y 6/1) silt loam; massive; friable; strong brown (7.5YR 5/8) stains along root channels; very strongly acid.

The organic material ranges from 16 to 51 inches in thickness. It is dominantly sapric material, but some pedons have thin layers of hemic or fibric material. The sapric material has hue of 5YR, 7.5YR, or 10YR or is neutral in hue. It has value of 2 or 3 and chroma of 0 to 2. The Cg horizon is sandy loam, loam, or silt loam.

Billett Series

The Billett series consists of deep, well drained and moderately well drained soils on outwash plains. These soils formed in loamy deposits and in the underlying sandy deposits. Permeability is moderately rapid in the subsoil and rapid in the substratum. Slope ranges from 0 to 12 percent.

Typical pedon of Billett sandy loam, 2 to 6 percent slopes, 2,050 feet south and 150 feet east of the center of sec. 6, T. 30 N., R. 9 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) sandy loam, brown (10YR 5/3) dry; weak medium subangular blocky structure; friable; medium acid; abrupt smooth boundary.

E—9 to 11 inches; brown (10YR 5/3) sandy loam; weak medium platy structure; friable; slightly acid; clear wavy boundary.

BE—11 to 20 inches; dark brown (10YR 4/3) sandy loam; weak fine subangular blocky structure; friable; strongly acid; clear smooth boundary.

Bt—20 to 30 inches; dark brown (7.5YR 4/4) sandy loam; moderate medium subangular blocky structure; friable; common distinct clay films on faces of peds; very strongly acid; clear smooth boundary.

BC—30 to 36 inches; dark brown (7.5YR 4/4) loamy sand; weak medium subangular blocky structure; very friable; very strongly acid; gradual smooth boundary.

C1—36 to 40 inches; strong brown (7.5YR 5/6) stratified fine sand and sand; single grain; loose; strongly acid; gradual smooth boundary.

C2—40 to 60 inches; yellowish brown (10YR 5/6) stratified fine sand and sand; single grain; loose; strongly acid.

The thickness of the solum ranges from 30 to 40 inches. The Ap horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 to 3. Some pedons do not have an E horizon. The Bt horizon has hue of 7.5YR or 10YR and value and chroma of 4 to 6. It is sandy loam or fine sandy loam. The BC horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. It is loamy sand or sandy loam. The C horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 6. It is fine sand or sand or is stratified with these textures.

Boone Series

The Boone series consists of moderately deep, excessively drained, rapidly permeable soils on ridgetops and valley slopes in the uplands. These soils formed in sandy residuum over sandstone. Slope ranges from 20 to 45 percent.

Typical pedon of Boone fine sand, 20 to 45 percent slopes, 1,440 feet south and 100 feet east of the center of sec. 35, T. 28 N., R. 8 W.

A—0 to 2 inches; very dark gray (10YR 3/1) fine sand, very dark grayish brown (10YR 3/2) dry; weak fine granular structure; very friable; many uncoated quartz grains; strongly acid; abrupt smooth boundary.

C1—2 to 4 inches; brown (7.5YR 5/2) fine sand; single grain; loose; very strongly acid; clear smooth boundary.

C2—4 to 9 inches; brown (10YR 5/3) sand; single grain; loose; strongly acid; gradual wavy boundary.

C3—9 to 22 inches; light yellowish brown (10YR 6/4) sand; single grain; loose; slightly acid; gradual smooth boundary.

Cr—22 to 60 inches; very pale brown (10YR 8/3 and 7/3) and pale brown (10YR 6/3), poorly cemented sandstone.

The depth to sandstone ranges from 20 to 40 inches. The A horizon has value of 3 to 5 and chroma of 1 or 2. The C horizon has value of 5 to 8 and chroma of 2 to 4. It is sand or fine sand. In some pedons the underlying sandstone has strongly consolidated layers.

Brill Series

The Brill series consists of deep, moderately well drained soils on outwash plains and stream terraces. These soils formed in silty and loamy deposits underlain by stratified sand and gravel. Permeability is moderate in the upper part of the subsoil and rapid or very rapid in the substratum. Slope ranges from 0 to 3 percent.

The Brill soils in this county have a slightly lower content of clay in the subsoil than is defined as the range for the series. Also, the transitional layer between the contrasting particle-size classes is slightly thicker. These differences, however, do not alter the usefulness or behavior of the soils.

Typical pedon of Brill silt loam, 0 to 3 percent slopes, 350 feet north and 425 feet east of the southwest corner of sec. 36, T. 29 N., R. 5 W.

Ap—0 to 8 inches; dark brown (10YR 3/3) silt loam, light brownish gray (10YR 6/2) dry; moderate medium granular structure; friable; strongly acid; abrupt smooth boundary.

E—8 to 11 inches; brown (10YR 5/3) silt loam, very pale brown (10YR 7/3) dry; moderate medium platy structure; friable; strongly acid; clear smooth boundary.

E/B—11 to 13 inches; brown (10YR 5/3) silt loam, very pale brown (10YR 7/3) dry (E); weak medium platy structure; E material makes up about 60 percent of the horizon; dark yellowish brown (10YR 4/4) silt loam (Bt); weak medium subangular blocky structure; friable; very strongly acid; clear smooth boundary.

B/E—13 to 17 inches; dark yellowish brown (10YR 4/4) silt loam (Bt); moderate medium subangular blocky structure; Bt material makes up about 60 percent of the horizon; brown (10YR 5/3) silt loam, very pale brown (10YR 7/3) dry (E); weak medium platy structure; friable; very strongly acid; clear smooth boundary.

Bt—17 to 25 inches; dark yellowish brown (10YR 4/4) silt loam; few medium prominent yellowish red (5YR 5/6) mottles; moderate medium subangular blocky structure; friable; few distinct patchy clay films on faces of peds; very strongly acid; clear wavy boundary.

BC—25 to 34 inches; brown (7.5YR 5/4) gravelly sandy loam; common medium faint strong brown (7.5YR 5/6) mottles; weak fine subangular blocky structure; very friable; few distinct patchy dark brown (7.5YR 3/2) clay films on faces of peds; light brownish gray (10YR 6/2) uncoated silt particles on faces of peds; very strongly acid; clear wavy boundary.

2C—34 to 60 inches; dark brown (7.5YR 4/4), stratified sand and gravel; single grain; loose; estimated 25 percent gravel; medium acid.

The thickness of the solum ranges from 30 to 40 inches. The thickness of the silty mantle ranges from 24 to 36 inches.

The Ap horizon has value of 3 or 4 and chroma of 2 or 3. The E horizon has value of 4 to 6 and chroma of 2 or 3. It is silt or silt loam. The Bt horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 4 or 5. It is silt loam or silty clay loam. The BC horizon has hue of 5YR or 7.5YR and value and chroma of 3 to 6. It is loam, sandy loam, gravelly sandy loam, or gravelly loamy sand. The 2C horizon has hue of 7.5YR or 10YR and value and chroma of 3 to 6. The content of gravel in this horizon ranges from 10 to 30 percent.

Burkhardt Series

The Burkhardt series consists of deep, excessively drained and somewhat excessively drained soils on outwash plains and stream terraces. These soils formed in thin deposits of loamy material and are underlain by stratified sand and gravel. Permeability is moderately rapid in the subsoil and rapid or very rapid in the substratum. Slope ranges from 0 to 3 percent.

Typical pedon of Burkhardt sandy loam, 0 to 3 percent slopes, 2,340 feet west and 100 feet north of the southeast corner of sec. 34, T. 28 N., R. 9 W.

Ap—0 to 8 inches; very dark brown (10YR 2/2) sandy loam, dark grayish brown (10YR 4/2) dry; weak medium subangular blocky structure parting to weak fine granular; very friable; strongly acid; abrupt smooth boundary.

AB—8 to 11 inches; dark brown (7.5YR 3/2) coarse sandy loam, dark brown (7.5YR 4/2) dry; weak medium subangular blocky structure; very friable; strongly acid; clear smooth boundary.

Bt—11 to 17 inches; dark brown (7.5YR 3/2) coarse sandy loam, dark brown (7.5YR 4/4) dry; moderate fine subangular blocky structure; friable; few distinct clay films on faces of peds; neutral; clear smooth boundary.

BC—17 to 19 inches; dark brown (7.5YR 4/4) gravelly coarse sand; weak medium subangular blocky structure; very friable; some clay bridges between sand grains; estimated 25 percent gravel; slightly acid; clear smooth boundary.

2C—19 to 60 inches; dark brown (7.5YR 4/4) and strong brown (7.5YR 5/6) stratified coarse sand and gravel; single grain; loose; slightly acid.

The solum is 12 to 24 inches thick. The mollic epipedon is 10 to 14 inches thick.

The A horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 to 3. The Bt horizon has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2 to 4. It is coarse sandy loam, sandy loam, or loam. The BC horizon is gravelly sandy loam, gravelly loamy sand, or gravelly coarse sand. The content of gravel in the BC and 2C horizons ranges from 15 to 30 percent. The 2C horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6.

Cable Series

The Cable series consists of deep, poorly drained and very poorly drained soils on ground moraines. These soils formed in silty deposits and in the underlying sandy loam glacial till. Permeability is moderately slow or moderate in the subsoil and moderately slow in the substratum. Slope ranges from 0 to 2 percent.

Typical pedon of Cable silt loam, 0 to 2 percent slopes, 750 feet south and 75 feet east of the northwest corner of sec. 34, T. 32 N., R. 5 W.

Oi—2 inches to 0; very dark grayish brown (10YR 3/2), undecomposed sedges.

A—0 to 4 inches; very dark gray (10YR 3/1) silt loam, dark grayish brown (10YR 4/2) dry; weak fine granular structure; friable; strongly acid; abrupt smooth boundary.

Eg—4 to 6 inches; gray (10YR 5/1) silt loam; few fine prominent strong brown (7.5YR 5/6) mottles; weak medium platy structure; friable; very strongly acid; clear smooth boundary.

Bg1—6 to 16 inches; grayish brown (10YR 5/2) silt loam; common medium prominent yellowish brown (10YR 5/6) mottles; weak fine subangular blocky structure; friable; medium acid, clear wavy boundary.

2Bg2—16 to 26 inches; grayish brown (10YR 5/2) loam; many medium prominent strong brown (7.5YR 5/6 and 5/8) mottles; weak fine subangular blocky structure; friable; medium acid; clear wavy boundary.

2C1—26 to 32 inches; dark brown (7.5YR 4/4) sandy loam; common medium distinct reddish gray (5YR 5/2) mottles; massive; friable; estimated 5 percent gravel and 5 percent cobbles; medium acid; clear smooth boundary.

2C2—32 to 60 inches; reddish brown (5YR 4/4) sandy loam; massive; friable; estimated 5 percent gravel and 5 percent cobbles; neutral.

The thickness of the solum ranges from 20 to 40 inches. The thickness of the silty mantle ranges from 10 to 30 inches.

The A horizon has value of 2 or 3 and chroma of 1 or 2. The Eg horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 or 2. It is silt loam, loam, or fine sandy loam. The Bg horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 1 or 2. It is silt loam, loam, or sandy loam. The 2C horizon has hue of 5YR or 7.5YR, value of 4 to 6, and chroma of 2 to 4. It is sandy loam or gravelly sandy loam. The content of gravel and cobbles is 0 to 5 percent in the A and Bg horizons and 5 to 20 percent in the 2C horizon.

Campia Series

The Campia series consists of deep, well drained, moderately permeable soils on glacial lake plains and terraces. These soils formed in silty lacustrine deposits and in the underlying stratified silty and sandy deposits. Slope ranges from 2 to 20 percent.

Typical pedon of Campia silt loam, 2 to 6 percent slopes, 600 feet north and 900 feet east of the southwest corner of sec. 30, T. 32 N., R. 8 W.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak fine subangular blocky structure; friable; slightly acid; abrupt smooth boundary.

E—8 to 12 inches; brown (7.5YR 5/2) silt loam; weak thin platy structure; friable; medium acid; clear wavy boundary.

E/B—12 to 19 inches; brown (7.5YR 5/2) silt loam (E); weak medium platy structure; E material makes up about 60 percent of the horizon; reddish brown (5YR 4/4) silt loam (Bt); moderate fine subangular blocky structure; friable; pinkish gray (7.5YR 7/2) uncoated silt particles on vertical faces of peds; medium acid; clear wavy boundary.

B/E—19 to 24 inches; reddish brown (5YR 4/4) silt loam (Bt); moderate medium subangular blocky structure; Bt material makes up about 80 percent of the horizon; brown (7.5YR 5/2) silt loam (E); weak medium platy structure; firm; thin patchy clay films on faces of peds; pinkish gray (7.5YR 7/2) uncoated silt particles on vertical faces of peds; medium acid; clear wavy boundary.

Bt1—24 to 34 inches; reddish brown (5YR 4/4) silty clay loam; strong medium angular blocky structure; firm; common prominent continuous clay films on faces of peds; strongly acid; clear wavy boundary.

Bt2—34 to 42 inches; reddish brown (5YR 4/4) silty clay loam; weak coarse prismatic structure parting to moderate coarse subangular blocky; firm; few distinct patchy clay films on faces of peds; few thin strata of dark brown (7.5YR 4/4) very fine sand; strongly acid; clear wavy boundary.

C—42 to 60 inches; reddish brown (5YR 4/4) silt loam; moderate thick plates; firm; few thin strata of dark brown (7.5YR 4/4) very fine sand; medium acid.

The thickness of the solum ranges from 30 to 45 inches. The Ap horizon has value of 3 or 4. Some pedons have an A horizon, which has value of 2 or 3. The E horizon has value of 4 to 6 and chroma of 2 or 3. The Bt and C horizons have hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4. The Bt horizon is silt loam or silty clay loam. The C horizon is silt loam that has thin strata of silty clay loam, silt, or very fine sand.

Caryville Series

The Caryville series consists of deep, well drained soils on flood plains and stream terraces. These soils formed in loamy deposits underlain by sand. Permeability is moderately rapid in the upper loamy material and moderately rapid or rapid in the substratum. Slope ranges from 0 to 3 percent.

Typical pedon of Caryville sandy loam, 0 to 3 percent slopes, 1,660 feet south and 300 feet west of the northeast corner of sec. 10, T. 28 N., R. 9 W.

Ap—0 to 9 inches; dark reddish brown (5YR 2/2) sandy loam, reddish gray (5YR 5/2) dry; weak medium subangular blocky structure; friable; slightly acid; abrupt smooth boundary.

A—9 to 16 inches; dark reddish brown (5YR 3/2) sandy loam, reddish brown (5YR 5/3) dry; weak medium subangular blocky structure; friable; slightly acid; gradual smooth boundary.

AC—16 to 20 inches; dark reddish brown (5YR 3/4) loamy sand; weak medium subangular blocky structure; very friable; slightly acid; gradual smooth boundary.

2C—20 to 60 inches; brown (7.5YR 5/4) sand; single grain; loose; slightly acid.

The A horizon ranges from 10 to 20 inches in thickness. It has hue of 5YR or 7.5YR and value and chroma of 2 or 3. The AC horizon has hue of 5YR or 7.5YR and value and chroma of 3 or 4. It is sandy loam or loamy sand. The 2C horizon has hue of 5YR or 7.5YR, value or 4 or 5, and chroma of 3 or 4. It is sand or loamy sand.

Chetek Series

The Chetek series consists of deep, somewhat excessively drained soils on outwash plains, stream terraces, and pitted moraines. These soils formed in thin deposits of loamy material and are underlain by stratified sand and gravel. Permeability is moderately rapid in the subsoil and rapid or very rapid in the substratum. Slope ranges from 0 to 40 percent.

Typical pedon of Chetek sandy loam, 2 to 6 percent slopes, 1,790 feet west and 200 feet south of the northeast corner of sec. 22, T. 29 N., R. 7 W.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) sandy loam, light brownish gray (10YR 6/2) dry; moderate fine granular structure; friable; medium acid; abrupt smooth boundary.

E—8 to 13 inches; brown (10YR 5/3) sandy loam, very pale brown (10YR 7/3) dry; weak medium platy structure; friable; medium acid; clear wavy boundary.

Bt1—13 to 17 inches; dark brown (7.5YR 4/4) sandy loam; moderate medium subangular blocky structure; friable; common distinct continuous clay films on faces of peds; estimated 15 percent gravel; strongly acid; clear smooth boundary.

2Bt2—17 to 20 inches; dark brown (7.5YR 4/4) gravelly loamy sand; weak medium subangular blocky structure; very friable; few faint clay bridges between sand grains; estimated 25 percent gravel; medium acid; abrupt smooth boundary.

2C—20 to 60 inches; strong brown (7.5YR 5/6) stratified sand and gravel; single grain; loose; estimated 25 percent gravel; medium acid.

The thickness of the solum and of the loamy deposits ranges from 16 to 24 inches. The Ap horizon has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2 or 3. The E horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 or 3. The Bt horizon has hue of 5YR or 7.5YR and value and chroma of 3 or 4. It is loam or sandy loam. The 2Bt horizon has hue of 5YR or 7.5YR and value and chroma of 4 or 5. It is gravelly loamy sand or gravelly sandy loam. The content of gravel ranges from 15 to 35 percent in the 2Bt and 2C horizons. The 2C horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6.

Comstock Series

The Comstock series consists of deep, somewhat poorly drained soils on glacial lake plains. These soils formed in silty lacustrine deposits. Permeability is moderate in the subsoil and moderately slow in the substratum. Slope ranges from 0 to 2 percent.

Typical pedon of Comstock silt loam, 0 to 2 percent slopes, 50 feet south and 750 feet east of the center of sec. 26, T. 29 N., R. 5 W.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, light brownish gray (10YR 6/2) dry; weak fine subangular blocky structure; friable; strongly acid; abrupt smooth boundary.

E—8 to 12 inches; grayish brown (10YR 5/2) silt loam; few fine distinct yellowish brown (10YR 5/4) mottles; weak thin platy structure; friable; strongly acid; clear wavy boundary.

B/E—12 to 22 inches; brown (10YR 5/3) silt loam (Bt); many medium distinct yellowish brown (10YR 5/6) mottles; weak very thick platy structure parting to moderate medium subangular blocky; firm; Bt material makes up about 60 percent of the horizon; grayish brown (10YR 5/2) silt loam (E); friable; thin discontinuous clay films and light brownish gray (10YR 6/2) uncoated silt particles on vertical faces of peds in the Bt part; very strongly acid; clear wavy boundary.

Bt—22 to 38 inches; dark yellowish brown (10YR 4/4) silt loam; many coarse prominent strong brown (7.5YR 5/8) and common medium distinct grayish brown (10YR 5/2) mottles; weak very thick platy structure parting to moderate medium subangular blocky; firm; light brownish gray (10YR 6/2) uncoated silt particles on vertical faces of peds; few distinct discontinuous clay films on faces of peds; very strongly acid; clear wavy boundary.

BC—38 to 48 inches; yellowish brown (10YR 5/4) silt loam; many coarse prominent strong brown (7.5YR 5/8) and common medium faint grayish brown (10YR 5/2) mottles; weak very thick platy structure parting to weak medium subangular blocky; friable; strongly acid; gradual wavy boundary.

C—48 to 60 inches; yellowish brown (10YR 5/4) silt loam; many coarse distinct strong brown (7.5YR 5/6) mottles; massive; friable; strongly acid.

The thickness of the solum ranges from 28 to 50 inches. The Ap horizon has value of 3 or 4 and chroma of 1 or 2. The E horizon has value of 4 to 6 and chroma of 2 or 3. The Bt horizon has hue of 5YR, 7.5YR, or 10YR, value of 4 or 5, and chroma of 3 or 4. It is silt loam or silty clay loam. The C horizon has colors similar to those of the Bt horizon.

Crystal Lake Series

The Crystal Lake series consists of deep, moderately well drained soils on glacial lake plains. These soils formed in silty lacustrine deposits underlain by stratified silty and sandy deposits. Permeability is moderate in the subsoil and moderately slow in the substratum. Slope ranges from 0 to 3 percent.

Typical pedon of Crystal Lake silt loam, 0 to 3 percent slopes, 2,120 feet south and 25 feet east of the northwest corner of sec. 15, T. 32 N., R. 7 W.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, light brownish gray (10YR 6/2) dry; weak fine subangular blocky structure; friable; strongly acid; abrupt smooth boundary.

E—8 to 14 inches; grayish brown (10YR 5/2) silt loam; weak thin platy structure; friable; strongly acid; clear wavy boundary.

E/B—14 to 24 inches; grayish brown (10YR 5/2) silt loam (E); common fine prominent strong brown (7.5YR 5/6) mottles; weak medium platy structure; E material makes up about 60 percent of the horizon; dark brown (7.5YR 4/4) silt loam (Bt); weak medium subangular blocky structure; friable; thin discontinuous clay films on faces of peds; strongly acid; clear wavy boundary.

Bt1—24 to 34 inches; dark brown (7.5YR 4/4) silt loam; few medium faint strong brown (7.5YR 5/6) and few medium distinct strong brown (7.5YR 5/8) mottles; weak coarse prismatic structure parting to moderate medium subangular blocky; friable; common distinct discontinuous clay films on faces of peds; pinkish gray (7.5YR 6/2) uncoated silt particles on vertical faces of peds; very strongly acid; gradual wavy boundary.

Bt2—34 to 44 inches; dark brown (7.5YR 4/4) silt loam; few medium prominent strong brown (7.5YR 5/8) mottles; weak very thick platy structure parting to weak medium subangular blocky; friable; few distinct patchy clay films on faces of peds; few thin strata of very fine sand; strongly acid; gradual smooth boundary.

C—44 to 60 inches; brown (7.5YR 5/4) silt loam; few medium prominent yellowish red (5YR 4/8) and few medium faint pinkish gray (7.5YR 6/2) mottles; weak thick plates; friable; few thin strata of very fine sand; very strongly acid.

The thickness of the solum ranges from 28 to 50 inches. The Ap horizon has value of 3 or 4. The E horizon has value of 4 to 6. The Bt horizon has hue of 5YR, 7.5YR, or 10YR, value of 4 or 5, and chroma of 3 or 4. The C horizon has colors similar to those of the Bt horizon. It is silt loam that has thin strata of silty clay loam, fine sandy loam, very fine sandy loam, fine sand, or very fine sand.

Eleva Series

The Eleva series consists of moderately deep, well drained and somewhat excessively drained soils on uplands. These soils formed in loamy deposits underlain by sandy residuum and sandstone. Permeability is moderate or moderately rapid in the subsoil and moderately rapid or rapid in the substratum. Slope ranges from 2 to 20 percent.

Typical pedon of Eleva sandy loam, 6 to 12 percent slopes, eroded, 700 feet east and 1,400 feet south of the center of sec. 33, T. 31 N., R. 9 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) sandy loam, light brownish gray (10YR 6/2) dry; moderate medium subangular blocky structure; friable; slightly acid; abrupt smooth boundary.

BA—9 to 14 inches; dark yellowish brown (10YR 4/4) loam; weak medium subangular blocky structure; friable; slightly acid; clear smooth boundary.

Bt1—14 to 28 inches; dark yellowish brown (10YR 4/4) loam; moderate medium subangular blocky structure; friable; few distinct clay films on faces of peds; medium acid; clear smooth boundary.

Bt2—28 to 36 inches; yellowish brown (10YR 5/4) sandy loam; weak medium subangular blocky structure; friable; few distinct clay films on faces of peds; estimated 2 percent sandstone channers 2 to 5 inches long; very strongly acid; clear smooth boundary.

C—36 to 40 inches; yellowish brown (10YR 5/6) sand; single grain; loose; medium acid; clear smooth boundary.

Cr—40 to 60 inches; brownish yellow (10YR 6/6), poorly cemented sandstone.

The thickness of the solum and the depth to sandstone range from 20 to 40 inches. The Ap or A horizon has value of 3 to 5 and chroma of 2 to 4. The Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 5. The C horizon has hue of 7.5YR or 10YR, value of 5 to 7, and chroma of 4 to 6.

Elkmound Series

The Elkmound series consists of shallow, well drained soils on uplands. These soils formed in a thin layer of loamy deposits and are underlain by sandstone (fig. 13). Permeability is moderate or moderately rapid. Slope ranges from 2 to 45 percent.

Typical pedon of Elkmound loam, 12 to 20 percent slopes, eroded, 1,550 feet east and 250 feet south of the northwest corner of sec. 6, T. 30 N., R. 9 W.

Ap—0 to 7 inches; dark brown (10YR 3/3) loam, pale brown (10YR 6/3) dry; weak thick platy structure

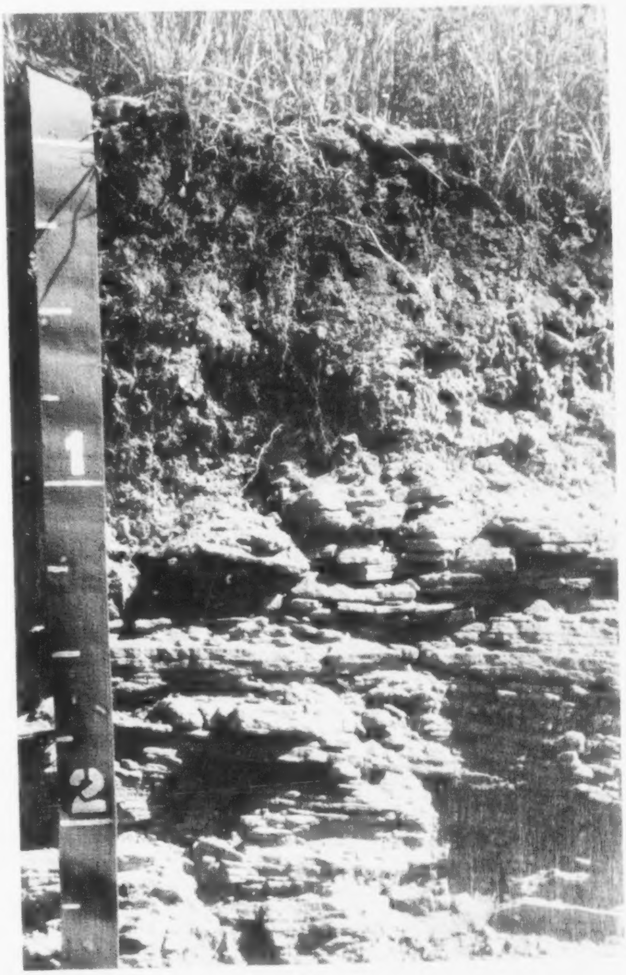

Figure 13.—Profile of an Elkmound soil. Sandstone is at a depth of about 12 inches. Depth is marked in feet.

parting to weak fine subangular blocky; friable; neutral; abrupt smooth boundary.

BE—7 to 10 inches; yellowish brown (10YR 5/4) sandy loam; weak thick platy structure parting to weak fine subangular blocky; friable; slightly acid; clear wavy boundary.

Bw1—10 to 16 inches; dark yellowish brown (10YR 4/4) sandy loam; weak very thick platy structure parting to moderate medium subangular blocky; friable; strongly acid; clear smooth boundary.

Bw2—16 to 19 inches; yellowish brown (10YR 5/4 and 5/6) loamy fine sand; single grain; very friable; estimated 5 percent sandstone channers 3 to 6 inches long; strongly acid; clear smooth boundary.

R—19 inches; yellowish brown (10YR 5/4 and 5/6), partially weathered, platy sandstone.

The thickness of the solum and the depth to sandstone range from 10 to 20 inches. The content of sandstone channers ranges from 0 to 15 percent throughout the solum.

The Ap or A horizon has hue of 7.5YR or 10YR, value of 2 to 4, and chroma of 1 to 4. The Bw1 horizon has hue of 7.5YR or 10YR and value and chroma of 3 to 5. It is sandy loam or loam.

Elm Lake Series

The Elm Lake series consists of moderately deep or deep, poorly drained soils in drainageways on uplands. These soils formed in sandy deposits underlain by sandy, silty, and loamy material weathered from sandstone interbedded with shale. Permeability is rapid in the sandy mantle and very slow in the underlying silty or loamy residuum. Slope ranges from 0 to 2 percent.

Typical pedon of Elm Lake loamy sand, 0 to 2 percent slopes, 800 feet west and 100 feet north of the center of sec. 30, T. 28 N., R. 8 W.

A—0 to 4 inches; black (10YR 2/1) loamy sand, dark gray (10YR 4/1) dry; weak medium subangular blocky structure; very friable; very strongly acid; abrupt smooth boundary.

C1—4 to 9 inches; grayish brown (10YR 5/2) loamy sand; weak thick platy structure; friable; strongly acid; clear wavy boundary.

C2—9 to 14 inches; light brownish gray (10YR 6/2) sand; single grain; loose; medium acid; clear wavy boundary.

C3—14 to 23 inches; pale brown (10YR 6/3) sand; single grain; loose; medium acid; abrupt smooth boundary.

2C4—23 to 25 inches; gray (10YR 5/1) silty clay loam; few coarse prominent reddish yellow (7.5YR 6/8) mottles; massive; firm; dark gray (N 4/0) organic stains in root and worm channels; extremely acid; clear smooth boundary.

2C5—25 to 27 inches; gray (5Y 6/1) silty clay loam; massive; firm; very strongly acid; clear smooth boundary.

2C6—27 to 48 inches; olive gray (5Y 5/2) silty clay loam; common coarse prominent strong brown (7.5YR 5/8) mottles; massive; firm; estimated 10 percent sandstone channers 1 to 3 inches long; very strongly acid; clear smooth boundary.

3Cr—48 to 60 inches; very pale brown (10YR 7/3), poorly cemented sandstone interbedded with shale.

The depth to sandstone and shale residuum ranges from 20 to 30 inches. The depth to interbedded sandstone and shale ranges from 30 to 50 inches.

The A horizon has value of 2 or 3 and chroma of 1 or 2. The C horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 to 3. It is sand or loamy sand. The 2C horizon is dominantly clay loam or silty clay loam, but in many pedons it has thin strata of finer or coarser textured material. It has hue of 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 1 or 2.

Fallcreek Series

The Fallcreek series consists of deep, somewhat poorly drained, moderately slowly permeable soils on ground moraines. These soils formed in loamy glacial till. Slope ranges from 2 to 6 percent.

Typical pedon of Fallcreek sandy loam, 2 to 6 percent slopes, 1,100 feet south and 1,270 feet west of the northeast corner of sec. 35, T. 28 N., R. 5 W.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) sandy loam, light brownish gray (10YR 6/2) dry; weak medium subangular blocky structure; friable; medium acid; abrupt smooth boundary.

E—8 to 14 inches; brown (10YR 5/3) sandy loam; common coarse prominent strong brown (7.5YR 5/6 and 5/8) and few medium faint light brownish gray (10YR 6/2) mottles; weak medium platy structure; friable; strongly acid; clear wavy boundary.

E/B—14 to 20 inches; brown (10YR 5/3) sandy loam (E); common medium prominent strong brown (7.5YR 5/6 and 5/8) and common medium faint light brownish gray (10YR 6/2) mottles; weak medium platy structure; E material makes up about 65 percent of the horizon; yellowish brown (10YR 5/4) sandy loam (Bt); weak fine subangular blocky structure; friable; estimated 2 percent gravel; strongly acid; clear wavy boundary.

B/E—20 to 24 inches; reddish brown (5YR 4/4) loam (Bt); many medium prominent yellowish red (5YR 5/8) and few medium faint reddish gray (5YR 5/2) mottles; weak very thick platy structure parting to moderate medium subangular blocky; Bt material makes up about 75 percent of the horizon; brown (7.5YR 5/3) loam (E); weak medium platy structure;

firm; estimated 5 percent gravel; very strongly acid; gradual wavy boundary.

Bt1—24 to 34 inches; reddish brown (5YR 4/4) loam; many medium prominent yellowish red (5YR 5/8) and few medium faint reddish gray (5YR 5/2) mottles; weak coarse prismatic structure parting to strong medium subangular blocky; firm; many distinct continuous clay films on faces of peds; gray (5YR 6/1) uncoated silt particles and very fine sand grains on faces of prisms; estimated 10 percent gravel; very strongly acid; gradual smooth boundary.

Bt2—34 to 40 inches; reddish brown (5YR 4/4) loam; common medium distinct strong brown (7.5YR 5/6) mottles; weak coarse prismatic structure parting to moderate medium subangular blocky; firm; few distinct discontinuous clay films on faces of peds; pinkish gray (5YR 6/2) uncoated silt particles and very fine sand grains on faces of prisms; estimated 10 percent gravel; very strongly acid; gradual smooth boundary.

C—40 to 60 inches; reddish brown (5YR 5/4) loam; weak thick plates in the upper part and massive in the lower part; firm; estimated 10 percent gravel; very strongly acid.

The thickness of the solum ranges from 24 to 48 inches. The content of cobbles and stones is 0 to 5 percent throughout the profile.

The Ap horizon has value of 3 or 4 and chroma of 1 or 2. The E horizon has value of 4 to 6 and chroma of 2 or 3. The Bt and C horizons are loam or sandy loam. The content of gravel in the B and C horizons is 5 to 10 percent. The Bt1 horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4. The C horizon has hue of 5YR or 7.5YR and value and chroma of 4 or 5.

Flambeau Series

The Flambeau series consists of deep, moderately well drained soils on ground moraines. These soils formed in loamy glacial till (fig. 14). Permeability is moderate in the subsoil and moderately slow in the substratum. Slope ranges from 2 to 12 percent.

Typical pedon of Flambeau loam, 2 to 6 percent slopes, 400 feet north and 1,300 feet east of the center of sec. 6, T. 28 N., R. 6 W.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) loam, light brownish gray (10YR 6/2) dry; weak fine subangular blocky structure; friable; estimated 2 percent cobbles; slightly acid; abrupt smooth boundary.

E—8 to 12 inches; brown (10YR 5/3) loam, very pale brown (10YR 7/3) dry; weak medium platy structure; friable; estimated 2 percent cobbles; neutral; clear wavy boundary.

E/B—12 to 17 inches; brown (10YR 5/3) sandy loam, very pale brown (10YR 7/3) dry (E); common fine prominent strong brown (7.5YR 5/6 and 5/8) mottles; weak medium platy structure; E material makes up about 65 percent of the horizon; brown (7.5YR 5/4) sandy loam (Bt); weak fine subangular blocky structure; friable; estimated 3 percent gravel; very strongly acid; clear wavy boundary.

Bt1—17 to 23 inches; reddish brown (5YR 4/3) loam; common medium prominent yellowish red (5YR 4/8 and 5/8) mottles; strong fine and medium angular

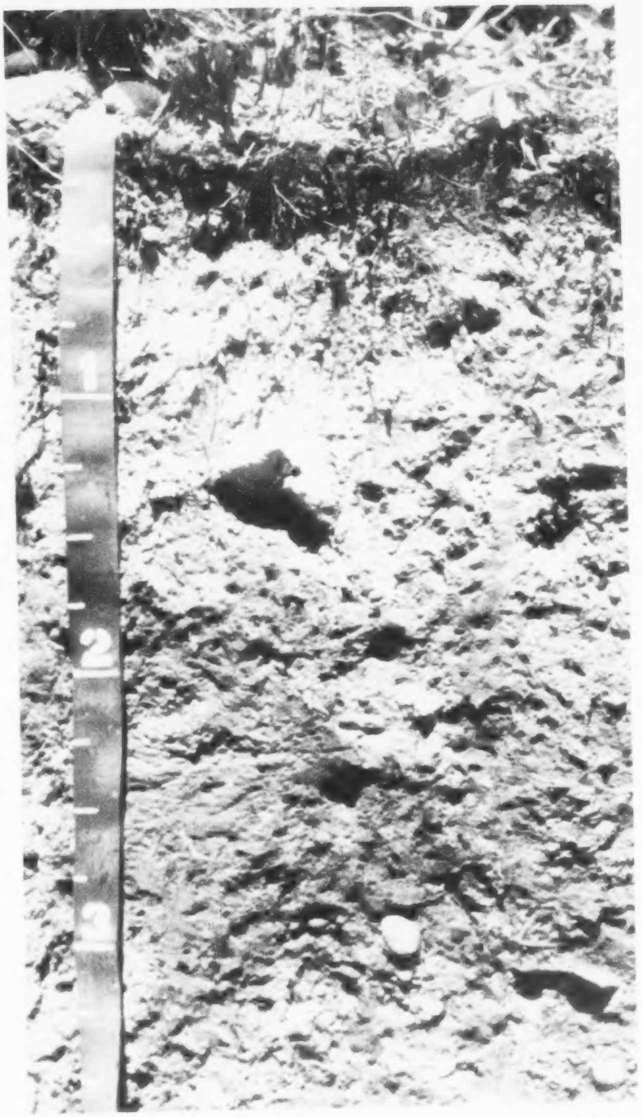

Figure 14.—Profile of a Flambeau soil. Loamy glacial till is at a depth of about 36 inches. Depth is marked in feet.

blocky structure; firm; pinkish gray (7.5YR 6/2) uncoated silt particles and very fine sand grains on faces of peds and around pebbles; many distinct continuous clay films on faces of peds; estimated 7 percent gravel; very strongly acid; gradual wavy boundary.

Bt2—23 to 36 inches; reddish brown (5YR 4/4) sandy clay loam; few fine faint yellowish red (5YR 5/6) mottles; moderate medium subangular blocky structure; firm; pinkish gray (7.5YR 6/2) uncoated silt particles and very fine sand grains on faces of peds; many distinct discontinuous clay films on faces of peds; estimated 5 percent gravel; very strongly acid; gradual smooth boundary.

C—36 to 60 inches; reddish brown (5YR 4/4) loam; weak very thick plates in the upper part and massive in the lower part; firm; estimated 7 percent gravel; medium acid.

The thickness of the solum ranges from 30 to 50 inches. The content of cobbles and stones ranges from 0 to 10 percent throughout the profile. The content of gravel ranges from 0 to 10 percent in the Bt and C horizons.

The Ap horizon has value of 3 or 4 and chroma of 1 or 2. The E horizon has chroma of 2 or 3. The Bt horizon has value of 4 or 5 and chroma of 3 or 4. It is loam or sandy clay loam. The C horizon has hue of 5YR or 7.5YR and value and chroma of 4 or 5.

Fordum Series

The Fordum series consists of deep, poorly drained and very poorly drained soils on flood plains. These soils formed in loamy and sandy deposits. Permeability is moderate or moderately rapid in the loamy mantle and rapid or very rapid in the sandy substratum. Slope ranges from 0 to 2 percent.

The Fordum soils in this county are slightly shallower to coarse textured material than is defined as the range for the series. This difference, however, does not alter the usefulness or behavior of the soils.

Typical pedon of Fordum loam, 0 to 2 percent slopes, 200 feet north and 1,650 feet east of the southwest corner of sec. 33, T. 29 N., R. 9 W.

A—0 to 9 inches; very dark grayish brown (10YR 3/2) loam, grayish brown (10YR 5/2) dry; few medium prominent yellowish brown (10YR 5/6 and 5/8) mottles; moderate medium granular structure; friable; slightly acid; abrupt smooth boundary.

C1—9 to 21 inches; grayish brown (10YR 5/2) sandy loam; common medium prominent yellowish brown (10YR 5/6 and 5/8) mottles; weak medium subangular blocky structure; very friable; medium acid; abrupt smooth boundary.

2C2—21 to 32 inches; brown (10YR 5/3) loamy sand; common medium prominent yellowish brown (10YR 5/6 and 5/8) mottles; single grain; loose; strata of yellowish red (5YR 5/6) and very dark grayish brown (10YR 3/2) sandy loam; slightly acid; abrupt smooth boundary.

2C3--32 to 60 inches; pale brown (10YR 6/3) sand; single grain; loose; slightly acid.

The A horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 to 3. The C horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 3 to 5, and chroma of 1 to 3. It occurs as strata of silt loam, loam, sandy loam, or loamy sand. The 2C horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 1 to 4. It is dominantly sand, loamy sand, or sand and gravel. In some pedons, however, it has strata of loam, silt loam, or sandy loam.

Freeon Series

The Freeon series consists of deep, moderately well drained soils on ground moraines and end moraines. These soils formed in silty deposits and in the underlying sandy loam glacial till. Permeability is moderately slow or moderate in the subsoil and moderately slow in the substratum. Slope ranges from 2 to 12 percent.

Typical pedon of Freeon silt loam, 2 to 6 percent slopes, 75 feet south and 1,840 feet west of the northeast corner of sec. 10, T. 29 N., R. 6 W.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak fine subangular blocky structure; friable; strongly acid; abrupt smooth boundary.

E--8 to 13 inches; brown (10YR 5/[illegible]) silt loam, very pale brown (10YR 7/3) dry; few fine faint dark yellowish brown (10YR 4/4) mottles; weak medium platy structure; friable; light gray (10YR 7/2) uncoated silt particles on faces of peds; strongly acid; clear irregular boundary.

E/B—13 to 19 inches; brown (10YR 5/3) silt loam, very pale brown (10YR 7/3) dry (E); few fine faint dark yellowish brown (10YR 4/4) and few medium prominent strong brown (7.5YR 5/8) mottles; weak medium platy structure; E material makes up about 60 percent of the horizon; dark brown (7.5YR 4/4) silt loam (Bt); moderate medium subangular blocky structure; friable; light gray (10YR 7/2) uncoated silt particles and very fine sand grains on faces of peds; thin continuous clay films on faces of peds; strongly acid; clear wavy boundary.

Bt1—19 to 23 inches; dark brown (7.5YR 4/4) silt loam; common medium prominent strong brown (7.5YR 5/8) mottles; weak coarse prismatic structure parting to moderate medium subangular blocky; firm; light gray (10YR 7/2) uncoated silt particles on faces of peds; common distinct continuous clay films on faces of peds; strongly acid; clear smooth boundary.

2Bt2—23 to 30 inches; reddish brown (5YR 4/3) loam; common medium prominent strong brown (7.5YR 5/6) mottles; weak coarse prismatic structure parting to moderate medium subangular blocky; firm; light gray (10YR 7/2) uncoated silt particles on faces of peds; common distinct discontinuous clay films on faces of peds; estimated 10 percent gravel; very strongly acid; gradual wavy boundary.

2Bt3—30 to 38 inches; reddish brown (5YR 4/4) sandy loam; few fine distinct strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; firm; few faint patchy clay films on faces of peds; estimated 5 percent gravel; slightly acid; gradual wavy boundary.

2C—38 to 60 inches; reddish brown (5YR 4/4) sandy loam; massive; firm; estimated 5 percent gravel; slightly acid.

The thickness of the solum ranges from 30 to 50 inches. The thickness of the silty mantle ranges from 15 to 30 inches.

The Ap horizon has value of 4 or 5 and chroma of 1 to 3. The E horizon has value of 4 or 5 and chroma of 2 or 3. It is silt or silt loam. The Bt horizon has hue of 5YR, 7.5YR, or 10YR, value of 4 to 6, and chroma of 3 to 5. The 2Bt and 2C horizons have hue of 2.5YR or 5YR and value and chroma of 3 to 5. They are sandy loam or loam. The content of gravel in these horizons ranges from 5 to 15 percent.

Friendship Series

The Friendship series consists of deep, moderately well drained, rapidly permeable soils on outwash plains and stream terraces. These soils formed in sandy deposits. Slope ranges from 0 to 3 percent.

Typical pedon of Friendship loamy sand, 0 to 3 percent slopes, 2,400 feet north and 150 feet west of the southeast corner of sec. 8, T. 28 N., R. 7 W.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) loamy sand, light brownish gray (10YR 6/2) dry; weak medium subangular blocky structure; very friable; medium acid; abrupt smooth boundary.

Bw—8 to 26 inches; dark brown (7.5YR 4/4) sand; weak medium subangular blocky structure; very friable; medium acid; clear wavy boundary.

BC—26 to 36 inches; brown (7.5YR 5/4) sand; common medium faint reddish brown (5YR 4/4) and dark brown (7.5YR 4/4) mottles; single grain; loose; medium acid; gradual smooth boundary.

C1—36 to 48 inches; strong brown (7.5YR 5/6) sand; common medium faint yellowish red (5YR 4/6) mottles; single grain; loose; medium acid; gradual smooth boundary.

C2—48 to 60 inches; light yellowish brown (10YR 6/4) sand; few fine distinct dark yellowish brown (10YR 4/4) mottles; single grain; loose; medium acid.

The thickness of the solum ranges from 20 to 40 inches. The Ap or A horizon has value of 2 or 3 and chroma of 1 or 2. The Bw and BC horizons have hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 or 4. The C horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 2 to 6.

Gale Series

The Gale series consists of moderately deep, well drained soils on uplands. These soils formed in silty deposits and in a thin layer of sandy residuum over sandstone. Permeability is moderate in the upper part of the profile and rapid in the sandy residuum. Slope ranges from 2 to 20 percent.

Typical pedon of Gale silt loam, 6 to 12 percent slopes, eroded, 1,280 feet east and 1,200 feet south of the center of sec. 31, T. 28 N., R. 7 W.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, light brownish gray (10YR 6/2) dry; weak medium subangular blocky structure; friable; medium acid; abrupt smooth boundary.

E—8 to 12 inches; brown (10YR 5/3) silt loam; weak medium platy structure; friable; slightly acid; clear wavy boundary.

BE—12 to 17 inches; dark brown (10YR 4/3) silt loam, very pale brown (10YR 7/3) dry; weak thick platy structure parting to weak fine subangular blocky; friable; very pale brown (10YR 7/3) uncoated silt particles and very fine sand grains on vertical faces of peds; slightly acid; clear wavy boundary.

Bt—17 to 30 inches; dark yellowish brown (10YR 4/4) silt loam; moderate medium subangular blocky structure; friable; few distinct discontinuous clay films on faces of peds; very pale brown (10YR 7/3) uncoated silt particles and very fine sand grains on vertical faces of peds; strongly acid; clear smooth boundary.

2BC—30 to 36 inches; yellowish brown (10YR 5/4) loamy fine sand; weak medium subangular blocky structure; friable; strongly acid; gradual smooth boundary.

2Cr—36 to 55 inches; very pale brown (10YR 7/4) and light gray (10YR 7/2), weathered sandstone.

2R—55 inches; very pale brown (10YR 7/4) and light gray (10YR 7/2), platy sandstone.

The thickness of the solum ranges from 18 to 36 inches. The depth to sandstone ranges from 20 to 40 inches.

The A or Ap horizon has value of 3 to 5 and chroma of 2 or 3. The E horizon has value of 4 to 6 and chroma of 2 or 3. The BE horizon has value of 4 to 6 and chroma of 3 or 4. The Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 or 4. The BE and Bt horizons are silt loam or silty clay loam. The 2BC horizon has hue of 7.5YR or 10YR and value and chroma of 4 to 6. It is loam, sandy loam, or loamy fine sand.

Greenwood Series

The Greenwood series consists of deep, very poorly drained soils in depressions on ground moraines and end moraines. These soils formed in herbaceous organic material more than 51 inches thick. Permeability is moderately rapid. Slope is 0 to 1 percent.

Typical pedon of Greenwood peat, 0 to 1 percent slopes, 100 feet north and 1,700 feet west of the southeast corner of sec. 7, T. 32 N., R. 8 W.

Oi—0 to 4 inches; light gray (2.5Y 7/2) fibric material; about 95 percent fiber, 90 percent rubbed; massive; live roots and sphagnum moss; extremely acid (pH 4.3 in water); clear smooth boundary.

Oe1—4 to 12 inches; hemic and woody material, dark brown (7.5YR 3/2) broken face, pressed, and rubbed; about 70 percent fiber, 20 percent rubbed; weak thick platy structure; less than 5 percent mineral material; nonsticky; herbaceous fibers extremely acid (pH 4.0 in water); clear smooth boundary.

Oe2—12 to 55 inches; hemic material, very dark grayish brown (10YR 3/2) broken face, pressed, and rubbed; about 70 percent fiber, 20 percent rubbed; weak thick platy structure; less than 5 percent mineral material; nonsticky; herbaceous fibers; extremely acid (pH 3.5 in water); clear smooth boundary.

Oa—55 to 60 inches; sapric material, very dark brown (10YR 2/2) broken face, pressed, and rubbed; about 60 percent fiber, 10 percent rubbed; weak thick platy structure; less than 10 percent mineral material; nonsticky; herbaceous fibers; extremely acid (pH 4.0 in water).

The organic material is more than 51 inches thick. It is dominantly hemic material, but some pedons have layers of fibric and sapric material. The combined thickness of these layers is less than 10 inches. The surface and subsurface tiers have hue of 5YR, 7.5YR, or 10YR and value and chroma of 2 to 4.

Halder Series

The Halder series consists of deep, somewhat poorly drained soils on stream terraces and outwash plains. These soils formed in loamy deposits over sand and gravel. Permeability is moderate in the upper part of the subsoil and rapid or very rapid in the substratum. Slope ranges from 0 to 2 percent.

Typical pedon of Halder loam, 0 to 2 percent slopes, 700 feet west and 100 feet south of the northeast corner of sec. 32, T. 29 N., R. 6 W.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) loam, light brownish gray (10YR 6/2) dry; weak fine subangular blocky structure; friable; slightly acid; abrupt smooth boundary.

E—8 to 12 inches; grayish brown (10YR 5/2) loam; common medium distinct dark brown (7.5YR 4/4) and common medium prominent strong brown (7.5YR 5/6) mottles; weak medium platy structure; friable; estimated 4 percent gravel; slightly acid; clear wavy boundary.

B/E—12 to 16 inches; dark brown (7.5YR 4/4) loam (Bt); common medium faint strong brown (7.5YR 5/6) and common medium prominent gray (5YR 6/1) mottles; moderate medium subangular blocky structure; Bt material makes up about 75 percent of the horizon; grayish brown (10YR 5/2) loam (E); common medium prominent strong brown (7.5YR 5/6) mottles; weak medium platy structure; friable; light gray (10YR 7/2) uncoated silt particles and very fine sand grains on faces of peds; estimated 4 percent gravel; medium acid; clear wavy boundary.

Bt—16 to 28 inches; dark brown (7.5YR 4/4) loam; common coarse prominent light brownish gray (10YR 6/2) and common medium prominent strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure; friable; light gray (10YR 7/2) uncoated silt particles and very fine sand grains on faces of peds; common distinct discontinuous clay films on faces of peds; estimated 7 percent gravel; strongly acid; gradual smooth boundary.

2BC—28 to 32 inches; dark brown (7.5YR 4/4) gravelly sandy loam; many fine faint strong brown (7.5YR 5/6) and few medium distinct grayish brown (10YR 5/2) mottles; weak medium subangular blocky structure; friable; estimated 20 percent gravel; strongly acid; gradual smooth boundary.

2C—32 to 60 inches; yellowish brown (10YR 5/4) and brown (7.5YR 5/4) stratified sand and gravel; single grain; loose; estimated 25 percent gravel; medium acid.

The thickness of the solum, or the depth to stratified sand and gravel, ranges from 24 to 36 inches. The A or Ap horizon has value of 2 to 4 and chroma of 2 or 3. The E horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 2 or 3. The Bt horizon has hue of 5YR, 7.5YR, 10YR, or 2.5Y, value of 3 to 6, and chroma of 2 to 8. The 2C horizon is sand or gravelly or very gravelly sand. The content of gravel in this horizon ranges from 5 to 50 percent.

Hiles Series

The Hiles series consists of moderately deep, moderately well drained, moderately permeable soils on uplands. These soils formed in silty deposits and in the underlying material weathered from sandstone interbedded with shale. Slope ranges from 2 to 6 percent.

Typical pedon of Hiles silt loam, 2 to 6 percent slopes, 200 feet south and 1,200 feet west of the northeast corner of sec. 30, T. 28 N., R. 7 W:

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak fine subangular blocky structure; very friable; neutral; abrupt smooth boundary.

E—8 to 11 inches; brown (10YR 5/3) silt loam, very pale brown (10YR 7/3) dry; weak medium platy structure; very friable; slightly acid; clear wavy boundary.

B/E—11 to 22 inches; yellowish brown (10YR 5/4) silt loam (Bt); moderate fine subangular blocky structure; Bt material makes up about 70 percent of the horizon; brown (10YR 5/3) silt loam, very pale brown (10YR 7/3) dry (E); weak medium platy structure; friable; thin discontinuous clay films on faces of peds; slightly acid; clear smooth boundary.

2Bt1—22 to 26 inches; olive (5Y 5/3) silty clay loam; few medium prominent strong brown (7.5YR 5/8) mottles; strong fine angular blocky structure; firm; common distinct discontinuous clay films on faces of peds; very strongly acid; clear smooth boundary.

2Bt2—26 to 30 inches; light olive gray (5Y 6/2) loam; common medium prominent strong brown (7.5YR 5/6 and 5/8) mottles; moderate medium subangular blocky structure; friable; common distinct discontinuous clay films on faces of peds; extremely acid; abrupt smooth boundary.

2Cr—30 to 60 inches; pale yellow (2.5Y 8/4) and yellow (2/5Y 8/6), weathered sandstone that has strata of olive (5Y 4/3 and 5/6) shale.

The thickness of the solum and the depth to sandstone and shale range from 22 to 40 inches. The thickness of the silty mantle ranges from 15 to 30 inches.

The A or Ap horizon has value of 2 to 4 and chroma of 1 or 2. The E horizon has value of 4 to 6 and chroma of 2 or 3. The 2Bt horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 2 to 4. It is loam, silt loam, or silty clay loam.

Hiles Variant

The Hiles Variant consists of deep, moderately well drained soils on uplands. These soils formed in loamy and clayey material weathered from sandstone and shale. Permeability is very slow in the subsoil and moderate in the substratum. Slope ranges from 2 to 8 percent.

Typical pedon of Hiles Variant loam, 2 to 8 percent slopes, 300 feet north and 200 feet west of the southeast corner of sec. 30, T. 29 N., R. 8 W.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) loam, light brownish gray (10YR 6/2) dry; weak fine subangular blocky structure; friable; strongly acid; abrupt smooth boundary.

E/B—8 to 14 inches; brown (7.5YR 5/2) loam (E); weak thin platy structure; E material makes up about 60 percent of the horizon; dark brown (7.5YR 4/4) loam (Bt); moderate fine subangular blocky structure; friable; estimated 2 percent hard sandstone channers 2 to 4 inches long; very strongly acid; clear wavy boundary.

2Bt1—14 to 26 inches; dusky red (10R 3/4) clay; few fine prominent reddish brown (5YR 4/4) mottles; weak thick platy structure parting to strong fine angular blocky; firm; common prominent continuous clay films on faces of peds; very strongly acid; clear smooth boundary.

2Bt2—26 to 40 inches; dusky red (10R 3/4) clay; few fine prominent reddish brown (5YR 4/4) mottles; strong medium angular blocky structure; firm; few distinct discontinuous clay films on faces of peds; few strata of olive gray (5Y 5/2) shale less than 1 inch thick; extremely acid; clear smooth boundary.

3C—40 to 48 inches; pale olive (5Y 6/3) and pale yellow (5Y 7/3) loam; massive; friable; few strata of dusky red (10R 3/4) clay less than 1 inch thick; estimated 15 percent sandstone channers 1 to 3 inches long; very strongly acid; clear smooth boundary.

3Cr—48 to 54 inches; stratified olive gray (5Y 5/2) shale and yellowish brown (10YR 5/6), partially weathered sandstone.

3R—54 inches; light gray (10YR 7/2) sandstone.

The thickness of the solum ranges from 30 to 50 inches. The depth to sandstone and shale ranges from 40 to 60 inches.

The Ap horizon has value of 3 or 4 and chroma of 1 or 2. The content of sandstone channers in this horizon is 1 to 10 percent. The 2Bt horizon has hue of 10R, 2.5YR, or 5Y and value and chroma of 3 to 5. It is silty clay loam, silty clay, or clay. The 3C horizon has hue of 10R, 10YR, 2.5Y, or 5Y, value of 4 to 8, and chroma of 2 to 6. It is loam or clay loam that has strata of silty clay or clay.

Hixton Series

The Hixton series consists of moderately deep, well drained soils on uplands. These soils formed in loamy deposits underlain by sandy residuum and sandstone. Permeability is moderate in the subsoil and rapid in the substratum. Slope ranges from 2 to 12 percent.

Typical pedon of Hixton loam, 6 to 12 percent slopes, eroded, 2,490 feet south and 10 feet west of the center of sec. 10, T. 29 N., R. 9 W.

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) loam, light brownish gray (10YR 6/2) dry; weak medium subangular blocky structure; friable; slightly acid; abrupt smooth boundary.

E—7 to 11 inches; dark grayish brown (10YR 4/2) loam; weak medium platy structure; friable; medium acid; clear wavy boundary.

Bt—11 to 21 inches; dark yellowish brown (10YR 4/4) loam; moderate medium subangular blocky structure; friable; few distinct patchy clay films on faces of peds; light gray (10YR 7/2) uncoated silt particles on vertical faces of peds; strongly acid; clear wavy boundary.

BC—21 to 24 inches; brown (7.5YR 5/4) sandy loam; weak medium subangular blocky structure; friable; few thin patchy clay films on faces of peds; strongly acid; clear wavy boundary.

2C—24 to 34 inches; brown (7.5YR 5/4) and strong brown (7.5YR 5/6) loamy sand; single grain; loose; strongly acid; clear smooth boundary.

2R—34 inches; white (10YR 8/2), poorly cemented sandstone.

The thickness of the solum ranges from 14 to 34 inches. The depth to sandstone ranges from 20 to 40 inches.

The Ap or A horizon has value of 3 or 4. The E horizon has value of 4 or 5 and chroma of 2 or 3. The Bt and BC horizons have hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 or 4. The Bt horizon is loam or sandy clay loam. The BC horizon is loam or sandy loam. The 2C horizon has hue of 7.5YR or 10YR, value of 5 to 7, and chroma of 4 to 6. It is sand or loamy sand.

Humbird Series

The Humbird series consists of moderately deep, moderately well drained soils on uplands. These soils formed in loamy deposits and in the underlying material weathered from sandstone interbedded with shale. Permeability is moderately rapid in the upper part of the subsoil and slow in the lower part. Slope ranges from 2 to 12 percent.

Typical pedon of Humbird sandy loam, 2 to 6 percent slopes, 1,840 feet south and 700 feet west of the northeast corner of sec. 21, T. 28 N., R. 8 W.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) sandy loam, light brownish gray (10YR 6/2) dry; weak medium subangular blocky structure; very friable; neutral; abrupt smooth boundary.

Bs—8 to 16 inches; dark brown (7.5YR 4/4) sandy loam; weak medium subangular blocky structure; friable; slightly acid; clear wavy boundary.

2E—16 to 20 inches; brown (10YR 5/3) loamy sand; few medium prominent strong brown (7.5YR 5/6) mottles; weak thick platy structure parting to weak fine subangular blocky; very friable; slightly acid; clear wavy boundary.

2Bt1—20 to 25 inches; yellowish brown (10YR 5/4) loam; few medium distinct strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; friable; light gray (10YR 7/2) uncoated silt particles and very fine sand grains on faces of peds; few distinct clay films on faces of peds; slightly acid; abrupt smooth boundary.

3Bt2—25 to 36 inches; light olive gray (5Y 6/2) silty clay loam; common coarse prominent strong brown (7.5YR 5/6) mottles; massive; firm; few faint clay films on faces of peds; extremely acid; abrupt smooth boundary.

3Cr—36 to 60 inches; yellow (10YR 7/6), weathered sandstone interbedded with shale.

The thickness of the solum and the depth to sandstone and shale range from 24 to 40 inches. The depth to material weathered from sandstone interbedded with shale ranges from 15 to 36 inches. The thickness and arrangement of the sandy, loamy, and clayey layers vary greatly.

The Ap or A horizon has value of 2 to 4 and chroma of 2 or 3. The Bs horizon has value and chroma of 3 or 4. It is loamy fine sand or sandy loam. The 2E horizon has value of 5 to 7 and chroma of 2 or 3. It is sandy loam, loamy sand, or loam. The 2Bt and 3Bt horizons have hue of 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 2 to 4. The 2Bt1 horizon is sandy loam or loam. The 3Bt2 horizon is silty clay loam or silty clay.

Kert Series

The Kert series consists of deep, somewhat poorly drained soils on uplands. These soils formed in silty and loamy deposits underlain by clayey, sandy, and silty material weathered from sandstone interbedded with shale. Permeability is moderate or moderately rapid in the silty mantle and slow in the subsoil and substratum. Slope ranges from 1 to 6 percent.

Typical pedon of Kert silt loam, 1 to 6 percent slopes, 1,470 feet north and 250 feet west of the center of sec. 7, T. 30 N., R. 9 W.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, light brownish gray (10YR 6/2) dry; weak fine subangular blocky structure; friable; strongly acid; abrupt smooth boundary.

E—8 to 14 inches; brown (10YR 5/3) silt loam; common coarse prominent yellowish brown (10YR 5/6) mottles; weak thin platy structure; friable; strongly acid; clear wavy boundary.

E/B—14 to 22 inches; grayish brown (10YR 5/2) silt loam (E); many medium distinct dark brown (7.5YR 4/4) and many medium prominent reddish brown (5YR 4/4) mottles; weak thick platy structure; E material makes up about 60 percent of the horizon; brown (10YR 5/3) silt loam (Bt); weak fine subangular blocky structure; friable; strongly acid; clear wavy boundary.

2Bt1—22 to 28 inches; pale olive (5Y 6/3) loam; few coarse prominent light brownish gray (10YR 6/2) and many medium prominent strong brown (7.5YR 5/8) mottles; weak thick platy structure parting to moderate fine subangular blocky; friable; common distinct discontinuous clay films on faces of peds; light gray (10YR 7/2) uncoated silt particles on vertical faces of peds; very strongly acid; clear smooth boundary.

2Bt2—28 to 40 inches; dark brown (7.5YR 4/4) sandy loam; common medium distinct grayish brown (10YR 5/2) mottles; weak fine subangular blocky structure; friable; few faint clay films on faces of peds; strongly acid; clear wavy boundary.

3C1—40 to 44 inches; olive yellow (2.5Y 6/6) and pale yellow (2.5Y 7/4) stratified sand and silt; weak thick plates; friable; strongly acid; clear smooth boundary.

3C2—44 to 60 inches; reddish yellow (7.5YR 6/6) loam; massive; friable; estimated 10 percent sandstone channers 0.5 inch to 3.0 inches long; strongly acid.

The thickness of the solum ranges from 24 to 40 inches. The thickness of the silty mantle ranges from 12 to 30 inches.

The Ap horizon has value of 2 or 3. The E horizon has value of 4 to 6 and chroma of 2 or 3. The E/B horizon is loam, sandy loam, or silt loam. The Bt horizon has hue of 2.5YR, 5YR, 7.5YR, 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 2 to 6. It is clay, clay loam, loam, sandy loam, silt loam, silty clay, or silty clay loam. The 3C horizon has hue of 2.5YR, 5YR, 7.5YR, 10YR, 2.5Y, 5Y, or 5G, value of 3 to 7, and chroma of 2 to 6. It is stratified sand and silt, clay loam, sandy clay loam, silty clay, or loam.

Lows Series

The Lows series consists of deep, poorly drained soils on stream terraces and valley fills. These soils formed in loamy and silty deposits underlain by sand. Permeability is moderate in the subsoil and rapid in the substratum. Slope ranges from 0 to 2 percent.

Typical pedon of Lows loam, 0 to 2 percent slopes, 900 feet east and 600 feet south of the northwest corner of sec. 28, T. 28 N., R. 8 W.

Ap—0 to 9 inches; very dark gray (10YR 3/1) loam, gray (10YR 5/1) dry; weak medium subangular blocky structure; friable; medium acid; abrupt smooth boundary.

Eg—9 to 16 inches; gray (10YR 5/1) loam; common medium prominent dark brown (7.5YR 4/4) mottles; weak medium platy structure; friable; medium acid; clear wavy boundary.

Bg1—16 to 22 inches; gray (10YR 5/1) loam; weak thick platy structure parting to weak fine subangular blocky; friable; slightly acid; clear wavy boundary.

Bg2—22 to 28 inches; gray (10YR 6/1) loam; few medium prominent yellowish red (5YR 4/6) mottles; moderate medium subangular blocky structure; friable; slightly acid; gradual smooth boundary.

Bg3—28 to 35 inches; gray (10YR 5/1) silt loam; common coarse prominent yellowish red (5YR 4/6) mottles; moderate medium subangular blocky structure; friable; slightly acid; gradual smooth boundary.

BCg—35 to 39 inches; light brownish gray (2.5Y 6/2) sandy loam; common coarse prominent brown (7.5YR 5/4) and light reddish brown (5YR 6/3) mottles; weak medium subangular blocky structure; friable; slightly acid; clear smooth boundary.

2Cg—39 to 60 inches; gray (10YR 6/1) sand; single grain; loose; medium acid.

The thickness of the solum, or the depth to the underlying sand, ranges from 20 to 40 inches. The Ap or A horizon has value of 2 or 3 and chroma of 1 or 2. The E horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 or 2. The Bg horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 or 2. It is loam, sandy clay loam, or silt loam. The BCg horizon has colors similar to those of the Bg horizon. It is loamy sand, sandy loam, or loam. The 2Cg horizon has hue of 10YR or 2.5Y, value of 5 to 8, and chroma of 1 to 4.

Loyal Series

The Loyal series consists of deep, moderately well drained, moderately permeable soils on ground moraines. These soils formed in silty deposits and in the underlying loam glacial till. Slope ranges from 2 to 12 percent.

Typical pedon of Loyal silt loam, 2 to 6 percent slopes, 1,200 feet south and 500 feet west of the northeast corner of sec. 36, T. 29 N., R. 5 W.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, light brownish gray (10YR 6/2) dry; weak fine subangular blocky structure; friable; slightly acid; abrupt smooth boundary.

E—8 to 11 inches; brown (10YR 5/3) silt loam, very pale brown (10YR 7/3) dry; weak thick platy structure; friable; slightly acid; clear wavy boundary.

E/B—11 to 16 inches; pale brown (10YR 6/3) silt loam, very pale brown (10YR 8/3) dry (E); moderate thick platy structure, E material makes up about 70 percent of the horizon; brown (7.5YR 5/4) silt loam (Bt); common medium distinct yellowish red (5YR 5/6) and common medium prominent yellowish red (5YR 5/8) mottles; weak medium subangular blocky structure; friable; strongly acid; clear wavy boundary.

B/E—16 to 22 inches; brown (7.5YR 5/4) silt loam (Bt); weak medium subangular blocky structure; Bt material makes up about 60 percent of the horizon; pale brown (10YR 6/3) silt loam (E); few medium prominent strong brown (7.5YR 5/8) mottles; moderate thick platy structure; friable; thin discontinuous clay films on faces of peds; strongly acid; clear wavy boundary.

2Bt1—22 to 27 inches; reddish brown (5YR 4/3) loam; common medium prominent strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure; firm; common prominent continuous clay films on faces of peds; estimated 10 percent gravel; very strongly acid; gradual smooth boundary.

2Bt2—27 to 44 inches; reddish brown (5YR 4/4) loam; few fine distinct strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; firm; common distinct discontinuous clay films on faces of peds; estimated 10 percent gravel; very strongly acid; gradual smooth boundary.

2C—44 to 60 inches; reddish brown (5YR 4/4) loam; few fine distinct strong brown (7.5YR 5/6) mottles; massive; firm; estimated 10 percent gravel; very strongly acid.

The thickness of the solum ranges from 24 to 50 inches. The thickness of the silty mantle ranges from 15 to 30 inches.

The Ap horizon has value of 2 to 4 and chroma of 1 to 3. The E horizon has value of 4 to 6 and chroma of 2 or 3. Some pedons have a Bt horizon, which has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 or 4. The 2Bt1 horizon has hue of 5YR or 7.5YR and value and chroma of 3 or 4. It is loam, sandy clay loam, or clay loam. The 2Bt2 horizon has colors similar to those of the 2Bt1 horizon. The 2Bt2 and 2C horizons are loam or sandy clay loam. The 2C horizon has hue of 5YR or 7.5YR and value and chroma of 4 or 5. The content of gravel in the 2Bt and 2C horizons ranges from 1 to 12 percent. In some pedons the content of cobbles is as much as 3 percent in the 2C horizon.

Lupton Series

The Lupton series consists of deep, very poorly drained, moderately rapidly permeable soils in depressions on ground moraines, outwash plains, and glacial lake plains. These soils formed in decomposed woody organic material more than 51 inches thick. Slope is 0 to 1 percent.

Typical pedon of Lupton muck, 0 to 1 percent slopes, 1,000 feet south and 700 feet west of the northeast corner of sec. 17, T. 32 N., R. 8 W.

Oa1—0 to 12 inches; sapric material, very dark brown (10YR 2/2) broken face, black (10YR 2/1) pressed and rubbed; about 40 percent fiber, 8 percent rubbed; weak fine subangular blocky structure; slightly sticky; about 30 percent woody fiber; neutral (pH 7.0 in water); gradual smooth boundary.

Oa2—12 to 45 inches; sapric material, dark brown (7.5YR 3/2) broken face, black (N 2/0) pressed and rubbed about 45 percent fiber, 10 percent rubbed; weak fine subangular blocky structure; slightly sticky; about 30 percent woody fiber and 70 percent herbaceous fiber; neutral (pH 7.0 in water); gradual smooth boundary.

Oa3—45 to 60 inches; sapric material, very dark brown (10YR 2/2) broken face, black (10YR 2/1) pressed and rubbed; about 35 percent fiber, 5 percent rubbed; weak medium granular structure; slightly sticky; about 25 percent woody fiber and 65 percent herbaceous fiber; neutral (pH 7.0 in water).

The organic material is more than 51 inches thick. It is typically woody sapric material, but some pedons have layers of hemic and fibric material. The combined thickness of these layers is less than 10 inches. The sapric material has hue of 5YR, 7.5YR, or 10YR or is neutral in hue. It has value of 2 or 3 and chroma of 0 to 3. The content of woody fragments is as much as 30 percent.

Magnor Series

The Magnor series consists of deep, somewhat poorly drained soils on ground moraines. These soils formed in silty deposits and in the underlying sandy loam glacial till. Permeability is moderately slow or moderate in the silty mantle and moderately slow in the lower part of the subsoil and in the substratum. Slope ranges from 1 to 6 percent.

Typical pedon of Magnor silt loam, 1 to 6 percent slopes, 250 feet east and 700 feet south of the northwest corner of sec. 16, T. 29 N., R. 6 W.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, light brownish gray (10YR 6/2) dry; weak fine subangular blocky structure; friable; slightly acid; abrupt smooth boundary.

E—8 to 11 inches; grayish brown (10YR 5/2) silt loam; few medium distinct dark brown (7.5YR 4/4) mottles; weak medium platy structure; friable; slightly acid; clear wavy boundary.

E/B—11 to 14 inches; grayish brown (10YR 5/2) silt loam (E); few medium faint light brownish gray (10YR 6/2) and common medium prominent strong brown (7.5YR 5/6) mottles; weak medium platy structure; E material makes up about 60 percent of the horizon; dark brown (7.5YR 4/4) silt loam (Bt); weak fine subangular blocky structure; friable; slightly acid; clear wavy boundary.

B/E—14 to 18 inches; dark brown (7.5YR 4/4) silt loam (Bt); common medium faint strong brown (7.5YR 5/6) and common medium prominent light brownish gray (10YR 6/2) mottles; weak fine subangular blocky structure; Bt material makes up about 60 percent of the horizon; grayish brown (10YR 5/2) silt loam (E); weak medium platy structure; friable; medium acid; clear wavy boundary.

2Bt1—18 to 24 inches; dark brown (7.5YR 4/4) sandy loam; common medium prominent light brownish gray (10YR 6/2) and yellowish red (5YR 4/6) mottles; weak very thick platy structure parting to moderate fine subangular blocky; friable; common distinct discontinuous clay films on faces of peds; light gray (10YR 7/2) uncoated silt particles and very fine sand grains on faces of peds and on vertical cleavage planes; estimated 5 percent gravel; medium acid; gradual wavy boundary.

2Bt2—24 to 32 inches; reddish brown (5YR 5/4) loam; common medium prominent light brownish gray (10YR 6/2) and common medium prominent yellowish red (5YR 5/8) and strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure; friable; few distinct discontinuous clay films on faces of peds; light gray (10YR 7/2) uncoated silt particles and very fine sand grains on faces of peds and on vertical cleavage planes; estimated 5 percent gravel; strongly acid; gradual wavy boundary.

2C—32 to 60 inches; reddish brown (5YR 4/4) sandy loam; common fine prominent strong brown (7.5YR 5/6) mottles; massive; friable; estimated 10 percent gravel; slightly acid.

The thickness of the solum ranges from 30 to 50 inches. The thickness of the silty mantle ranges from 15 to 30 inches.

The Ap horizon has value of 3 or 4 and chroma of 2 or 3. The E horizon has value of 4 to 6 and chroma of 2 or 3. It is silt loam or silt. The 2Bt horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is loam or sandy loam. The content of gravel and cobbles in the 2Bt and 2C horizons is 5 to 10 percent. The 2C horizon has value of 4 or 5 and chroma of 3 to 6.

Mahtomedi Series

The Mahtomedi series consists of deep, excessively drained, rapidly permeable soils on outwash plains and pitted moraines. These soils formed in sandy and gravelly deposits. Slope ranges from 2 to 40 percent.

Typical pedon of Mahtomedi loamy sand, 2 to 6 percent slopes, 2,190 feet north and 400 feet east of the center of sec. 17, T. 32 N., R. 9 W.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) loamy sand, light brownish gray (10YR 6/2) dry; weak fine granular structure; very friable; neutral; abrupt smooth boundary.

Bw1—8 to 18 inches; reddish brown (5YR 4/4) loamy sand; weak medium subangular blocky structure; very friable; slightly acid; clear smooth boundary.

Bw2—18 to 24 inches; reddish brown (5YR 4/4) gravelly sand; weak medium subangular blocky structure; very friable; estimated 15 percent gravel; slightly acid; clear smooth boundary.

C—24 to 60 inches; dark brown (7.5YR 4/4) sand and gravel; single grain; loose; medium acid.

The thickness of the solum ranges from 20 to 36 inches. The content of gravel ranges from 0 to 10 percent in the upper part of the solum and from 0 to 35 percent in the lower part and in the substratum.

The Ap or A horizon has value of 3 or 4. The Bw horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is loamy sand, sand, or gravelly sand. The C horizon has hue of 5YR or 7.5YR, value of 4 to 6, and chroma of 3 or 4.

Markey Series

The Markey series consists of deep, very poorly drained soils in depressions on outwash plains and ground moraines. These soils formed in decomposed organic material over sandy deposits. Permeability is moderately rapid in the organic layers and rapid in the substratum. Slope is 0 to 1 percent.

Typical pedon of Markey muck, 0 to 1 percent slopes, 150 feet south and 1,300 feet west of the northeast corner of sec. 21, T. 28 N., R. 8 W.

Oa1—0 to 8 inches; sapric material, dark brown (7.5YR 3/2) broken face and pressed, very dark brown (10YR 2/2) rubbed; about 65 percent fiber, less than 15 percent rubbed; weak thick platy structure; nonsticky; herbaceous fibers; strongly acid (pH 5.1 in water); clear smooth boundary.

Oa2—8 to 16 inches; sapric material, black (10YR 2/1) broken face, rubbed, and pressed; about 15 percent fiber, less than 5 percent rubbed; weak medium subangular blocky structure; estimated 8 percent mineral material; slightly sticky; herbaceous fibers; strongly acid (pH 5.5 in water); clear smooth boundary.

Oa3—16 to 36 inches; sapric material, black (N 2/0) broken face, rubbed, and pressed; less than 5 percent fiber, a trace rubbed; weak medium subangular blocky structure; estimated 15 percent mineral material; sticky; herbaceous fibers; strongly acid (pH 5.5 in water); gradual smooth boundary.

Cg—36 to 60 inches; gray (10YR 6/1) sand; single grain; loose; slightly acid.

The organic material ranges from 16 to 51 inches in thickness. It is dominantly sapric material, but some pedons have thin layers of hemic or fibric material. The sapric material has hue of 5YR, 7.5YR, or 10YR or is neutral in hue. It has value of 2 or 3 and chroma of 0 to 3. The Cg horizon has hue of 10YR or 2.5Y or is neutral in hue. It has value of 5 or 6 and chroma of 0 to 2. It is sand or loamy sand.

Meehan Series

The Meehan series consists of deep, somewhat poorly drained, rapidly permeable soils on outwash plains. These soils formed in sandy deposits. Slope ranges from 0 to 2 percent.

Typical pedon of Meehan loamy sand, 0 to 2 percent slopes, 500 feet south and 925 feet west of the center of sec. 8, T. 29 N., R. 10 W.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) loamy sand, dark grayish brown (10YR 4/2) dry; weak medium subangular blocky structure; very friable; medium acid; abrupt smooth boundary.

Bw1—8 to 12 inches; brown (10YR 5/3) sand; weak fine subangular blocky structure; very friable; strongly acid; clear wavy boundary.

Bw2—12 to 17 inches; pale brown (10YR 6/3) sand; few fine prominent strong brown (7.5YR 5/8) mottles; single grain; loose; slightly acid; gradual smooth boundary.

BC—17 to 30 inches; light brownish gray (10YR 6/2) sand; few fine prominent strong brown (7.5YR 5/8) mottles; single grain; loose; medium acid; gradual smooth boundary.

C—30 to 60 inches; light brownish gray (10YR 6/2) sand; single grain; loose; slightly acid.

The thickness of the solum ranges from 24 to 48 inches. The Ap or A horizon has value of 2 or 3 and chroma of 1 or 2. The Bw and BC horizons have hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 2 to 8. They are loamy sand or sand. The C horizon has hue of 7.5YR or 10YR, value of 4 to 7, and chroma of 2 to 4.

Menahga Series

The Menahga series consists of deep, excessively drained, rapidly permeable soils on outwash plains. These soils formed in sandy deposits. Slope ranges from 0 to 12 percent.

Typical pedon of Menahga loamy sand, 0 to 6 percent slopes, 1,300 feet south and 475 feet west of the northeast corner of sec. 17, T. 28 N., R. 10 W.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) loamy sand, light brownish gray (10YR 6/2) dry; weak medium granular structure; very friable; slightly acid; abrupt smooth boundary.

Bw1—8 to 15 inches; dark yellowish brown (10YR 4/4) sand; weak medium subangular blocky structure; very friable; medium acid; abrupt wavy boundary.

Bw2—15 to 28 inches; strong brown (7.5YR 5/6) sand; single grain; loose; medium acid; clear smooth boundary.

Bw3—28 to 40 inches; yellowish brown (10YR 5/6) sand; single grain; loose; medium acid; clear smooth boundary.

C—40 to 60 inches; brownish yellow (10YR 6/6) sand; single grain; loose; strongly acid.

The thickness of the solum ranges from 20 to 46 inches. The Ap horizon has value of 2 or 3 and chroma of 1 or 2. The Bw horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. The C horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 3 to 6.

Meridian Series

The Meridian series consists of deep, well drained and moderately well drained soils on stream terraces and valley fills. These soils formed in loamy deposits underlain by sandy material. Permeability is moderate or moderately rapid in the subsoil and rapid in the substratum. Slope ranges from 0 to 6 percent.

Typical pedon of Meridian loam, 2 to 6 percent slopes, 500 feet north and 400 feet east of the southwest corner of sec. 26, T. 28 N., R. 10 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) loam, brown (10YR 5/3) dry; moderate medium subangular blocky structure; friable; slightly acid; abrupt smooth boundary.

E—9 to 11 inches; brown (10YR 5/3) sandy loam; weak medium platy structure; friable; strongly acid; abrupt wavy boundary.

Bt1—11 to 32 inches; dark brown (7.5YR 4/4) loam; moderate medium subangular blocky structure; friable; common distinct discontinuous clay films on faces of peds; strongly acid; gradual smooth boundary.

Bt2—32 to 37 inches; brown (7.5YR 5/4) loam; weak medium subangular blocky structure; friable; few distinct discontinuous clay films on faces of peds; strongly acid; clear smooth boundary.

2C—37 to 60 inches; yellowish brown (10YR 5/4) sand; single grain; loose; strongly acid.

The thickness of the solum ranges from 25 to 37 inches. The Ap or A horizon has hue of 7.5YR or 10YR and value and chroma of 2 or 3. The E horizon has hue of 7.5YR or 10YR and value of 4 or 5. It is loam or sandy loam. The Bt horizon has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 3 to 6. It is loam or sandy clay loam. Some pedons have a BC horizon. This horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. It is loamy sand or sandy loam. The

2C horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 6. It is loamy sand or sand.

Merrillan Series

The Merrillan series consists of moderately deep, somewhat poorly drained soils on uplands. These soils formed in loamy deposits and in the underlying material weathered from sandstone interbedded with shale. Permeability is moderate in the upper part of the subsoil and slow in the lower part and in the substratum. Slope ranges from 1 to 6 percent.

The Merrillan soils in this county are taxadjuncts to the series because the E and Bs horizons are mottled. This difference, however, does not alter the usefulness or behavior of the soils.

Typical pedon of Merrillan sandy loam, 1 to 6 percent slopes, 200 feet north and 2,000 feet east of the center of sec. 21, T. 28 N., R. 8 W.

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) sandy loam, light brownish gray (10YR 6/2) dry; weak fine subangular blocky structure; friable; neutral; abrupt smooth boundary.

E—7 to 11 inches; brown (10YR 5/3) sandy loam; many coarse distinct dark brown (7.5YR 4/4) and many coarse prominent yellowish red (5YR 4/6) mottles; weak medium platy structure; friable; slightly acid; clear wavy boundary.

Bs—11 to 17 inches; dark brown (7.5YR 4/4) sandy loam; few coarse faint brown (7.5YR 5/2), common medium distinct yellowish red (5YR 4/6), and common medium prominent yellowish red (5YR 4/8) mottles; weak medium subangular blocky structure; friable; medium acid; clear wavy boundary.

E'—17 to 19 inches; grayish brown (10YR 5/2) sandy loam; common medium distinct dark brown (7.5YR 4/4) and common medium prominent strong brown (7.5YR 5/8) mottles; weak medium platy structure; friable; medium acid; clear smooth boundary.

2Bt1—19 to 25 inches; grayish brown (10YR 5/2) loam; many fine distinct dark brown (7.5YR 4/4) and many fine prominent strong brown (7.5YR 5/8) mottles; weak very thick platy structure parting to moderate medium subangular blocky; friable; common distinct patchy clay films on faces of peds; light gray (10YR 7/2) uncoated silt particles on faces of peds; very strongly acid; clear wavy boundary.

3Bt2—25 to 28 inches; gray (10YR 5/1) clay loam; many medium prominent strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure; firm; few distinct patchy clay films on faces of peds; very strongly acid; abrupt smooth boundary.

3C—28 to 48 inches; stratified greenish gray (5GY 6/1) and reddish brown (5YR 4/4) silty clay; massive; firm; very strongly acid; abrupt smooth boundary.

4Cr—48 to 60 inches; light gray (5Y 7/1) and light olive brown (2.5Y 5/4), poorly cemented sandstone interbedded with shale that has thin layers of well cemented sandstone.

The thickness of the solum ranges from 24 to 36 inches. The depth to material weathered from sandstone interbedded with shale ranges from 15 to 36 inches. The depth to sandstone and shale ranges from 24 to 40 inches.

The A or Ap horizon has value of 2 or 3 and chroma of 1 or 2. The Bs horizon has hue of 7.5YR or 10YR and value and chroma of 3 or 4. The E' horizon has value of 5 to 7 and chroma of 2 to 4. It is sandy loam or loamy sand. The 2Bt horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 2 to 4. It is silty clay loam, clay loam, silt clay, or loam. The 3C horizon has hue of 5YR, 7.5YR, 10YR, 2.5Y, 5Y, or 5GY, value of 4 to 7, and chroma of 1 to 4. The texture of the residuum varies, depending on the nature of the interbedded sandstone and shale.

Minocqua Series

The Minocqua series consists of deep, poorly drained and very poorly drained soils on outwash plains. These soils formed in loamy deposits underlain by sand and gravel. Permeability is moderate in the subsoil and rapid or very rapid in the substratum. Slope ranges from 0 to 2 percent.

In the Minocqua soils in this county, the content of sand coarser than loamy fine sand is slightly higher than is definitive for the series. This difference, however, does not alter the usefulness or behavior of the soils.

Typical pedon of Minocqua loam, 0 to 2 percent slopes, 400 feet north and 2,140 feet east of the southwest corner of sec. 15, T. 28 N., R. 8 W.

A—0 to 9 inches; black (10YR 2/1) loam, dark gray (10YR 4/1) dry; weak fine granular structure; very friable; very strongly acid; clear wavy boundary.

Bg1—9 to 23 inches; grayish brown (10YR 5/2) sandy loam; many coarse prominent yellowish red (5YR 4/8) mottles; weak fine subangular blocky structure; very friable; strongly acid; clear wavy boundary.

Bg2—23 to 38 inches; gray (10YR 5/1) loam; weak medium subangular blocky structure; friable; slightly acid; clear wavy boundary.

2C—38 to 60 inches; dark brown (7.5YR 4/4) sand and gravel; single grain; loose; slightly acid.

The thickness of the solum and the depth to sand and gravel range from 20 to 40 inches. The content of gravel in the solum ranges from 0 to 10 percent.

The A horizon has value of 2 or 3. The Bg1 horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 1 or 2. The Bg2 horizon has hue of 5YR, 7.5YR, or

10YR, value of 4 to 6, and chroma of 1 or 2. It is loam, sandy loam, or silt loam. The 2C horizon has hue of 5YR or 7.5YR, value of 3 to 6, and chroma of 3 or 4.

Moundville Series

The Moundville series consists of deep, moderately well drained, rapidly permeable soils on stream terraces and outwash plains. These soils formed in sandy deposits. Slope ranges from 0 to 3 percent.

Typical pedon of Moundville loamy sand, 0 to 3 percent slopes, 920 feet north and 90 feet east of the center of sec. 36, T. 28 N., R. 9 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) loamy sand, grayish brown (10YR 5/2) dry; weak medium subangular blocky structure; very friable; slightly acid; abrupt smooth boundary.

BE—9 to 18 inches; brown (7.5YR 5/4) loamy sand; weak medium subangular blocky structure; very friable; medium acid; clear wavy boundary.

Bt—18 to 24 inches; strong brown (7.5YR 5/6) loamy sand; few fine faint strong brown (7.5YR 5/8) mottles; weak medium subangular blocky structure; very friable; few distinct clay bridges between sand grains; strongly acid; clear wavy boundary.

BC—24 to 34 inches; dark yellowish brown (10YR 4/4) sand; common medium prominent strong brown (7.5YR 5/6) mottles; single grain; loose; strongly acid; clear smooth boundary.

C1—34 to 48 inches; brown (7.5YR 5/4) loamy sand; common medium prominent strong brown (7.5YR 5/8) and yellowish red (5YR 5/8) mottles; single grain; loose; slightly acid; gradual smooth boundary.

C2—48 to 53 inches; yellowish brown (10YR 5/6) sand; single grain; loose; slightly acid; gradual smooth boundary.

C3—53 to 60 inches; brown (7.5YR 5/4) sand; few fine faint brown (7.5YR 5/2) and strong brown (7.5YR 5/6) mottles; single grain; loose; slightly acid.

The thickness of the solum ranges from 26 to 40 inches. The Ap horizon has hue of 7.5YR or 10YR and value and chroma of 2 or 3. The Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. It is loamy sand or loamy fine sand. The BC and C horizons have hue of 7.5YR or 10YR and value and chroma of 4 to 6. The BC horizon is loamy sand or sand.

Newson Series

The Newson series consists of deep, poorly drained and very poorly drained, rapidly permeable soils on outwash plains and low stream terraces. These soils formed in sandy alluvial material. Slope ranges from 0 to 2 percent.

Typical pedon of Newson loamy sand, 0 to 2 percent slopes, 300 feet north and 250 feet west of the southeast corner of sec. 8, T. 28 N., R. 7 W.

A1—0 to 9 inches; black (10YR 2/1) loamy sand, very dark gray (10YR 3/1) dry; weak medium subangular blocky structure; very friable; very strongly acid; clear smooth boundary.

A2—9 to 14 inches; very dark gray (10YR 3/1) sand, dark grayish brown (10YR 4/2) dry; single grain; loose; very strongly acid; clear wavy boundary.

Bg—14 to 36 inches; grayish brown (10YR 5/2) sand; single grain; loose; strongly acid; gradual smooth boundary.

BCg—36 to 44 inches; pale brown (10YR 6/3) sand; few medium prominent dark brown (7.5YR 4/4) and many medium faint grayish brown (10YR 5/2) mottles; single grain; loose; strongly acid; gradual smooth boundary.

Cg—44 to 60 inches; light brownish gray (10YR 6/2) and pale brown (10YR 6/3) sand; single grain; loose; slightly acid.

The thickness of the solum ranges from 20 to 50 inches. The A horizon has value of 2 or 3 and chroma of 1 or 2. The Bg horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 or 5, and chroma of 1 or 2. The BCg and Cg horizons have value of 5 to 7 and chroma of 1 to 4.

Northfield Series

The Northfield series consists of shallow, well drained, moderately permeable soils on uplands. These soils formed in thin deposits of silty material and are underlain by sandy residuum and sandstone. Slope ranges from 2 to 20 percent.

Typical pedon of Northfield silt loam, 6 to 12 percent slopes, eroded, 1,890 feet east and 30 feet north of the southwest corner of sec. 23, T. 28 N., R. 10 W.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak fine subangular blocky structure; friable; medium acid; abrupt smooth boundary.

E—8 to 10 inches; brown (10YR 5/3) silt loam, very pale brown (10YR 7/3) dry; weak thin platy structure; friable; strongly acid; clear wavy boundary.

Bt1—10 to 15 inches; dark brown (7.5YR 4/4) silt loam; moderate fine subangular blocky structure; friable; few distinct discontinuous clay films on faces of peds; light gray (10YR 7/2) uncoated silt particles on faces of peds; very strongly acid; clear smooth boundary.

Bt2—15 to 18 inches; dark brown (7.5YR 4/4) silt loam; weak fine subangular blocky structure; friable; few distinct discontinuous clay films on faces of peds; estimated 10 percent sandstone channers 3 to 6 inches long; very strongly acid; gradual smooth boundary.

2R—18 inches; very pale brown (10YR 7/3), partially weathered, platy sandstone.

The thickness of the solum and the depth to sandstone range from 12 to 20 inches. The content of sandstone channers ranges from 0 to 10 percent throughout the solum.

The Ap or A horizon has value and chroma of 2 to 4. The E horizon has value of 4 or 5 and chroma of 2 or 3. The Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 or 4. It is loam or silt loam. Some pedons have a BC horizon, which is loamy sand or sandy loam.

Oesterle Series

The Oesterle series consists of deep, somewhat poorly drained soils on stream terraces and outwash plains. These soils formed in loamy deposits underlain by sand or by sand and gravel. Permeability is moderate in the upper part of the subsoil and rapid or very rapid in the substratum. Slope ranges from 0 to 2 percent.

Typical pedon of Oesterle sandy loam, 0 to 2 percent slopes, 1,100 feet south and 240 feet east of the center of sec. 34, T. 32 N., R. 9 W.

Ap—0 to 7 inches; very dark brown (10YR 2/2) sandy loam, grayish brown (10YR 5/2) dry; moderate medium granular structure; friable; medium acid; abrupt smooth boundary.

E—7 to 10 inches; dark grayish brown (10YR 4/2) sandy loam; moderate thick platy structure; friable; medium acid; clear smooth boundary.

E/B—10 to 17 inches; dark grayish brown (10YR 4/2) sandy loam (E); moderate medium platy structure; E material makes up about 70 percent of the horizon; dark yellowish brown (10YR 4/4) sandy loam (Bt); few medium faint grayish brown (10YR 5/2) mottles; moderate medium subangular blocky structure; friable; medium acid; clear wavy boundary.

Bt—17 to 25 inches; dark brown (7.5YR 4/4) sandy loam; common coarse distinct grayish brown (10YR 5/2) and common medium faint strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; friable; few distinct discontinuous clay films on faces of peds; estimated 10 percent gravel; strongly acid; clear wavy boundary.

BC—25 to 34 inches; dark yellowish brown (10YR 4/4) gravelly loamy sand; many medium prominent strong brown (7.5YR 5/6) and few medium distinct light brownish gray (10YR 6/2) mottles; weak medium subangular blocky structure; very friable; estimated 20 percent gravel; strongly acid; abrupt smooth boundary.

2C—34 to 60 inches; yellowish brown (10YR 5/4) sand and gravel; single grain; loose; medium acid.

The thickness of the solum ranges from 20 to 40 inches. The A or Ap horizon has value of 2 or 3 and chroma of 1 or 2. The E horizon has value of 4 to 6 and chroma of 2 or 3. The Bt horizon has hue of 7.5YR or 10YR and value and chroma of 4 to 6. It is loam or sandy loam. The BC horizon has hue of 5YR, 7.5YR, or 10YR, value of 4 to 6, and chroma of 2 to 6. It is gravelly loamy sand, gravelly sandy loam, loamy sand, or sandy loam. The content of gravel in the BC and 2C horizons ranges from 10 to 35 percent. The 2C horizon has colors similar to those of the BC horizon.

Orion Series

The Orion series consists of deep, somewhat poorly drained, moderately permeable soils on flood plains. These soils formed in silty deposits. Slope ranges from 0 to 2 percent.

Typical pedon of Orion silt loam, 0 to 2 percent slopes, 2,240 feet north and 200 feet east of the southwest corner of sec. 17, T. 29 N., R. 9 W.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak fine subangular blocky structure; friable; strongly acid; abrupt smooth boundary.

C1—7 to 20 inches; brown (10YR 5/3) silt loam; common medium distinct dark brown (7.5YR 4/4) and common medium prominent strong brown (7.5YR 5/6 and 5/8) mottles; weak thin plates between textural strata; friable; few thin strata of very pale brown (10YR 7/4) silt and very fine sand; medium acid; gradual smooth boundary.

C2—20 to 32 inches; dark grayish brown (10YR 4/2) silt loam; common fine prominent strong brown (7.5YR 5/8) and yellowish red (5YR 4/6) and few coarse distinct brown (7.5YR 5/2) mottles; weak medium plates between textural strata; friable; few thin strata of very pale brown (10YR 7/3) silt and very fine sand; strongly acid; abrupt smooth boundary.

Ab—32 to 43 inches; black (10YR 2/1) silt loam; few fine prominent red (2.5YR 4/6) mottles; weak thick platy structure parting to weak fine subangular blocky; friable; strongly acid; clear smooth boundary.

C'1—43 to 51 inches; dark gray (10YR 4/1) silt loam; few fine prominent dark brown (7.5YR 4/4) mottles; weak medium platy structure; friable; strongly acid; clear smooth boundary.

C'2—51 to 60 inches; grayish brown (10YR 5/2) silt loam; many fine distinct dark brown (7.5YR 4/4) and many fine prominent strong brown (7.5YR 5/6) mottles; moderate fine subangular blocky structure; friable; strongly acid.

The depth to the Ab horizon ranges from 20 to 40 inches. The Ap or A horizon has value of 4 or 5 and chroma of 2 or 3. The C1 and C2 horizons have value of

4 or 5 and chroma of 2 or 3. The Ab horizon has hue of 10YR or 2.5Y, value of 2 to 4, and chroma of 1 or 2. The C' horizon has value of 4 to 6 and chroma of 1 or 2.

Otterholt Series

The Otterholt series consists of deep, well drained soils on ground moraines. These soils formed in silty deposits over loamy glacial till. Permeability is moderate in the upper part of the profile and moderately slow in the lower part of the substratum. Slope ranges from 6 to 12 percent.

Typical pedon of Otterholt silt loam, 6 to 12 percent slopes, eroded, 2,240 feet north and 225 feet east of the southwest corner of sec. 21, T. 31 N., R. 6 W.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak fine subangular blocky structure; friable; slightly acid; abrupt smooth boundary.

E—8 to 10 inches; grayish brown (10YR 5/2) silt loam; weak thin platy structure; friable; slightly acid; clear wavy boundary.

E/B—10 to 16 inches; grayish brown (10YR 5/2) silt loam (E); weak medium platy structure; E material makes up about 70 percent of the horizon; dark brown (10YR 4/3) silt loam (Bt); moderate fine subangular blocky structure; friable; light gray (10YR 7/2) uncoated silt particles on faces of peds; medium acid; clear wavy boundary.

B/E—16 to 24 inches; dark yellowish brown (10YR 4/4) silt loam (Bt); moderate fine subangular blocky structure; Bt material makes up about 70 percent of the horizon; pale brown (10YR 6/3) silt loam (E); weak medium platy structure; friable; light gray (10YR 7/2) uncoated silt particles on faces of peds; very strongly acid; clear wavy boundary.

Bt1—24 to 32 inches; dark yellowish brown (10YR 4/4) silt loam; moderate medium subangular blocky structure; friable; few distinct discontinuous clay films on faces of peds; light gray (10YR 7/2) uncoated silt particles on faces of peds; very strongly acid; gradual smooth boundary.

Bt2—32 to 36 inches; yellowish brown (10YR 5/4) silt loam; moderate medium subangular blocky structure; friable; few distinct discontinuous clay films on faces of peds; light gray (10YR 7/2) uncoated silt particles on faces of peds; very strongly acid; gradual smooth boundary.

C1—36 to 43 inches; yellowish brown (10YR 5/4) silt loam; massive; friable; very strongly acid; clear smooth boundary.

2C2—43 to 60 inches; reddish brown (5YR 4/4) sandy loam; massive; friable; estimated 10 percent gravel; strongly acid.

The thickness of the solum ranges from 30 to 40 inches. The thickness of the silty mantle ranges from 30 to 48 inches.

The Ap horizon has value of 4 or 5 and chroma of 2 or 3. The Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 or 4. The C1 horizon has hue of 7.5YR or 10YR and value of 4 or 5. The 2C horizon has hue of 2.5YR, 5YR, or 7.5YR and value and chroma of 4 to 6. It is sandy loam or loam.

Plainbo Series

The Plainbo series consists of moderately deep, excessively drained, rapidly permeable soils on outwash plains, stream terraces, and uplands. These soils formed in sandy deposits over sandstone. Slope ranges from 2 to 20 percent.

Typical pedon of Plainbo loamy sand, 12 to 20 percent slopes, 150 feet south and 370 feet west of the center of sec. 30, T. 28 N., R. 8 W.

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) loamy sand, pale brown (10YR 6/3) dry; weak fine granular structure; very friable; slightly acid; abrupt smooth boundary.

Bw—6 to 13 inches; yellowish brown (10YR 5/4) sand; weak medium subangular blocky structure; very friable; medium acid; clear wavy boundary.

BC—13 to 20 inches; yellowish brown (10YR 5/6) sand; single grain; loose; medium acid; clear wavy boundary.

C—20 to 28 inches; brownish yellow (10YR 6/6) channery sand; single grain; loose; estimated 30 percent sandstone channers 1 to 4 inches long; slightly acid; clear wavy boundary.

2Cr—28 to 60 inches; very pale brown (10YR 7/3) and yellowish brown, (10YR 5/6) poorly cemented sandstone.

The thickness of the solum ranges from 20 to 36 inches. The depth to sandstone ranges from 20 to 40 inches.

The Ap horizon has value of 3 or 4 and chroma of 2 or 3. The Bw horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 6. It is sand or loamy sand. In some pedons the content of sandstone channers in this horizon is as much as 5 percent. The BC and C horizons have hue of 7.5YR or 10YR, value of 5 to 7, and chroma of 4 to 6. The content of sandstone channers in the C horizon ranges from 10 to 40 percent.

Plover Series

The Plover series consists of deep, somewhat poorly drained, moderately permeable soils on glacial lake plains. These soils formed in silty and loamy lacustrine deposits. Slope ranges from 0 to 2 percent.

Typical pedon of Plover silt loam, 0 to 2 percent slopes, 800 feet north and 900 feet east of the center of sec. 24, T. 32 N., R. 8 W.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; moderate fine subangular blocky structure; friable; slightly acid; abrupt smooth boundary.

E—8 to 14 inches; brown (10YR 5/3) silt loam, very pale brown (10YR 7/3) dry; few medium faint grayish brown (10YR 5/2) and common medium distinct dark brown (7.5YR 4/4) mottles; weak thin platy structure; friable; slightly acid; clear wavy boundary.

E/B—14 to 20 inches; brown (10YR 5/3) very fine sandy loam, very pale brown (10YR 7/3) dry (E); common medium faint grayish brown (10YR 5/2) and common medium prominent strong brown (7.5YR 5/6) mottles; weak medium platy structure; E material makes up about 60 percent of the horizon; dark brown (7.5YR 4/4) very fine sandy loam (Bt); weak thick platy structure parting to weak fine subangular blocky; friable; medium acid; clear wavy boundary.

B/E—20 to 24 inches; reddish brown (5YR 4/4) very fine sandy loam (Bt); common medium prominent grayish brown (10YR 5/2) and strong brown (7.5YR 5/6) mottles; weak thick platy structure parting to weak fine subangular blocky; Bt material makes up about 70 percent of the horizon; dark brown (7.5YR 4/2) very fine sandy loam (E); weak medium platy structure; friable; thin discontinuous clay films on faces of peds; strongly acid; clear wavy boundary.

Bt1—24 to 29 inches; reddish brown (5YR 4/4) silt loam; common medium prominent light brownish gray (10YR 6/2) mottles; weak thick platy structure parting to moderate fine subangular blocky; friable; common distinct discontinuous clay films on faces of peds; light gray (10YR 7/2) uncoated silt particles on vertical faces of peds; strongly acid; clear smooth boundary.

Bt2—29 to 38 inches; reddish brown (5YR 4/4) very fine sandy loam; common medium faint yellowish red (5YR 5/6) and common medium prominent yellowish red (5YR 5/8) mottles; weak thick platy structure parting to weak fine subangular blocky; friable; few faint discontinuous clay films on faces of peds; medium acid; clear smooth boundary.

C—38 to 60 inches; dark brown (7.5YR 4/4) stratified fine sand, very fine sand, and silt; massive; very friable; medium acid.

The thickness of the solum ranges from 24 to 40 inches. The Ap or A horizon has value of 2 to 4 and chroma of 1 to 3. The E horizon has value of 4 to 6 and chroma of 2 or 3. It is fine sandy loam, very fine sandy loam, or silt loam. The Bt horizon has hue of 5YR, 7.5YR, or 10YR and value and chroma of 4 or 5. It is dominantly fine sandy loam, silt loam, or very fine sandy loam. In some pedons, however, it has thin strata of loamy fine sand. The C horizon has hue of 5YR, 7.5YR, or 10YR and value and chroma of 4 to 6. It is dominantly stratified sand, very fine sand, and silt, but in many pedons it has thin strata of loamy sand, sandy loam, or loam.

Poskin Series

The Poskin series consists of deep, somewhat poorly drained soils on outwash plains and stream terraces. These soils formed in silty and loamy deposits underlain by sand and gravel. Permeability is moderate in the silty part of the subsoil and rapid or very rapid in the substratum. Slope ranges from 0 to 2 percent.

The Poskin soils in this county have a slightly lower content of clay in the subsoil than is defined as the range for the series. Also, they have a slightly thicker transitional layer between the contrasting particle-size classes. These differences, however, do not alter the usefulness or behavior of the soils.

Typical pedon of Poskin silt loam, 0 to 2 percent slopes, 100 feet north and 100 feet east of the southwest corner of sec. 26, T. 29 N., R. 5 W.

Ap—0 to 10 inches; dark brown (10YR 3/3) silt loam, light brownish gray (10YR 6/2) dry; moderate medium granular structure; friable; strongly acid; abrupt smooth boundary.

E—10 to 14 inches; brown (10YR 5/3) silt loam, very pale brown (10YR 7/3) dry; moderate medium platy structure; friable; strongly acid; clear smooth boundary.

E/B—14 to 19 inches; brown (10YR 5/3) silt, very pale brown (10YR 7/3) dry (E); common medium faint light brownish gray (10YR 6/2) and common medium prominent yellowish red (5YR 5/6) mottles; moderate medium platy structure; E material makes up about 60 percent of the horizon; dark yellowish brown (10YR 4/4) silt loam (Bt); moderate medium subangular structure; friable; very strongly acid; gradual smooth boundary.

B/E—19 to 23 inches; dark yellowish brown (10YR 4/4) silt loam (Bt); common medium distinct light brownish gray (10YR 6/2) and many medium prominent yellowish red (5YR 5/6) mottles; moderate medium subangular blocky structure; Bt material makes up about 60 percent of the horizon; brown (10YR 5/3) silt loam, very pale brown (10YR 7/3) dry (E); moderate medium platy structure; friable; very strongly acid; gradual smooth boundary.

Bt1—23 to 29 inches; dark yellowish brown (10YR 4/4) silt loam; common medium distinct light brownish gray (10YR 6/2) and strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; friable; few faint patchy clay films on faces of peds; strongly acid; abrupt smooth boundary.

2Bt2—29 to 38 inches; dark brown (7.5YR 4/4) sandy loam; common medium faint brown (7.5YR 5/2) and common medium distinct yellowish red (5YR 5/6) mottles; weak medium subangular blocky structure; friable; few faint discontinuous clay films on faces of peds; strongly acid; abrupt smooth boundary.

2C—38 to 60 inches; dark brown (7.5YR 4/4) sand and gravel; single grain; loose; medium acid.

The thickness of the solum ranges from 24 to 40 inches. The thickness of the silty mantle ranges from 24 to 36 inches.

The Ap horizon has value of 3 or 4. The E horizon has value of 4 to 6 and chroma of 2 or 3. The Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 or 4. The 2Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. It is sandy loam or loam. The 2C horizon has hue of 5YR, 7.5YR, or 10YR and value and chroma of 4 to 6. The content of gravel in this horizon ranges from 15 to 35 percent. Also, some pedons have a few cobbles.

Rib Series

The Rib series consists of deep, poorly drained soils on outwash plains and stream terraces. These soils formed in silty and loamy deposits underlain by stratified sand and gravel. Permeability is moderate in the subsoil and very rapid in the substratum. Slope ranges from 0 to 2 percent.

Typical pedon of Rib silt loam, 0 to 2 percent slopes, 150 feet south and 1,600 feet west of the northeast corner of sec. 2, T. 28 N., R. 5 W.

Ap—0 to 8 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; weak medium subangular blocky structure; friable; medium acid; abrupt smooth boundary.

Bg1—8 to 12 inches; gray (10YR 5/1) silt loam; common medium prominent yellowish brown (10YR 5/4) mottles; moderate medium platy structure; friable; medium acid; clear wavy boundary.

Bg2—12 to 19 inches; gray (10YR 5/1) silt loam; common fine prominent yellowish red (5YR 5/6) and common fine prominent light yellowish brown (2.5Y 6/4) mottles; weak thick platy structure parting to moderate fine subangular blocky; friable; slightly acid; clear wavy boundary.

Bg3—19 to 28 inches; gray (10YR 6/1) silt loam; many medium prominent yellowish red (5YR 5/6) and light yellowish brown (2.5Y 6/4) mottles; moderate medium subangular blocky structure; friable; slightly acid; clear wavy boundary.

2Bg4—28 to 33 inches; gray (10YR 6/1) loam; common medium prominent yellowish red (5YR 5/6) mottles; weak coarse subangular blocky structure; friable; estimated 7 percent gravel; slightly acid; clear smooth boundary.

2C—33 to 60 inches; yellowish brown (10YR 5/4) stratified sand and gravel; single grain; loose; slightly acid.

The thickness of the solum ranges from 24 to 40 inches. The thickness of the silty mantle ranges from 20 to 36 inches.

The Ap or A horizon has value of 2 or 3 and chroma of 1 or 2. It is silt loam or mucky silt loam. The Bg horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 1 or 2. It is silt loam or silty clay loam. The 2Bg horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 4 to 6, and chroma of 1 or 2. It is sandy loam or loam. The content of gravel in this horizon is 2 to 10 percent. The 2C horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 5 to 8, and chroma of 1 to 6. The content of gravel in this horizon ranges from 10 to 35 percent.

Richford Series

The Richford series consists of deep, well drained and somewhat excessively drained soils on stream terraces and outwash plains. These soils formed in sandy and loamy deposits underlain by coarse sand and gravel. Permeability is moderately rapid in the upper part of the subsoil and rapid in the lower part and in the substratum. Slope ranges from 0 to 3 percent.

Typical pedon of Richford loamy sand, 0 to 3 percent slopes, 700 feet south and 740 feet east of the center of sec. 21, T. 32 N., R. 9 W.

Ap—0 to 8 inches; dark brown (10YR 3/3) loamy sand, pale brown (10YR 6/3) dry; weak fine subangular blocky structure; very friable; neutral; abrupt smooth boundary.

E1—8 to 14 inches; dark brown (7.5YR 4/4) loamy sand; weak medium subangular blocky structure; very friable; slightly acid; clear wavy boundary.

E2—14 to 22 inches; yellowish brown (10YR 5/4) loamy sand; weak thick platy structure parting to weak fine subangular blocky; very friable; estimated 10 percent gravel; slightly acid; clear wavy boundary.

Bt1—22 to 30 inches; dark brown (7.5YR 4/4) sandy loam; moderate medium subangular blocky structure; friable; estimated 10 percent gravel; common distinct continuous clay films on vertical faces of peds; medium acid; clear wavy boundary.

Bt2—30 to 36 inches; dark brown (7.5YR 4/4) loamy sand; weak coarse subangular blocky structure; very friable; estimated 10 percent gravel; few distinct clay bridges between sand grains; medium acid; clear wavy boundary.

C—36 to 60 inches; yellowish brown (10YR 5/4) coarse sand and gravel; single grain; loose; estimated 10 percent gravel; slightly acid.

The thickness of the solum ranges from 30 to 45 inches. The Ap horizon has value and chroma of 2 or 3. The E horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 or 4. It is sand or loamy sand. The Bt horizon has value of 4 or 5 and chroma of 4 to 6. It is sandy loam or loamy sand. The C horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 3 to 6. The content of gravel in this horizon ranges from 10 to 30 percent.

Rosholt Series

The Rosholt series consists of deep, well drained soils on stream terraces and outwash plains. These soils formed in loamy deposits and in the underlying stratified sand and gravel (fig. 15). Permeability is moderate or moderately rapid in the subsoil and rapid or very rapid in the substratum. Slope ranges from 0 to 12 percent.

Typical pedon of Rosholt sandy loam, 2 to 6 percent slopes, 40 feet north and 1,940 feet west of the center of sec. 35, T. 32 N., R. 9 W.

Ap—0 to 8 inches; dark brown (10YR 3/3) sandy loam, pale brown (10YR 6/3) dry; moderate medium granular structure; very friable; strongly acid; abrupt smooth boundary.

E—8 to 10 inches; brown (10YR 5/3) sandy loam, very pale brown (10YR 7/3) dry; weak thin platy structure; very friable; medium acid; clear smooth boundary.

B/E—10 to 14 inches; dark brown (7.5YR 4/4) sandy loam (Bt); moderate medium subangular blocky structure; Bt material makes up about 70 percent of the horizon; brown (10YR 5/3) sandy loam, very pale brown (10YR 7/3) dry (E); weak thin platy structure; friable; medium acid; clear smooth boundary.

Bt1—14 to 20 inches; dark brown (7.5YR 4/4) sandy loam; moderate medium subangular blocky structure; friable; estimated 10 percent gravel; few distinct dark reddish brown (5YR 3/3) clay films on faces of peds; medium acid; clear smooth boundary.

Bt2—20 to 28 inches; dark brown (7.5YR 4/4) sandy loam; moderate medium subangular blocky structure; friable; estimated 10 percent gravel; few distinct reddish brown (5YR 4/4) clay films on faces of peds; strongly acid; clear smooth boundary.

2Bt3—28 to 34 inches; dark brown (7.5YR 4/4) gravelly sandy loam; weak medium subangular blocky structure; very friable; estimated 30 percent gravel; few faint clay films on faces of peds; strongly acid; clear smooth boundary.

2C—34 to 60 inches; reddish brown (5YR 4/4) stratified sand and gravel; single grain; loose; estimated 40 percent gravel; medium acid.

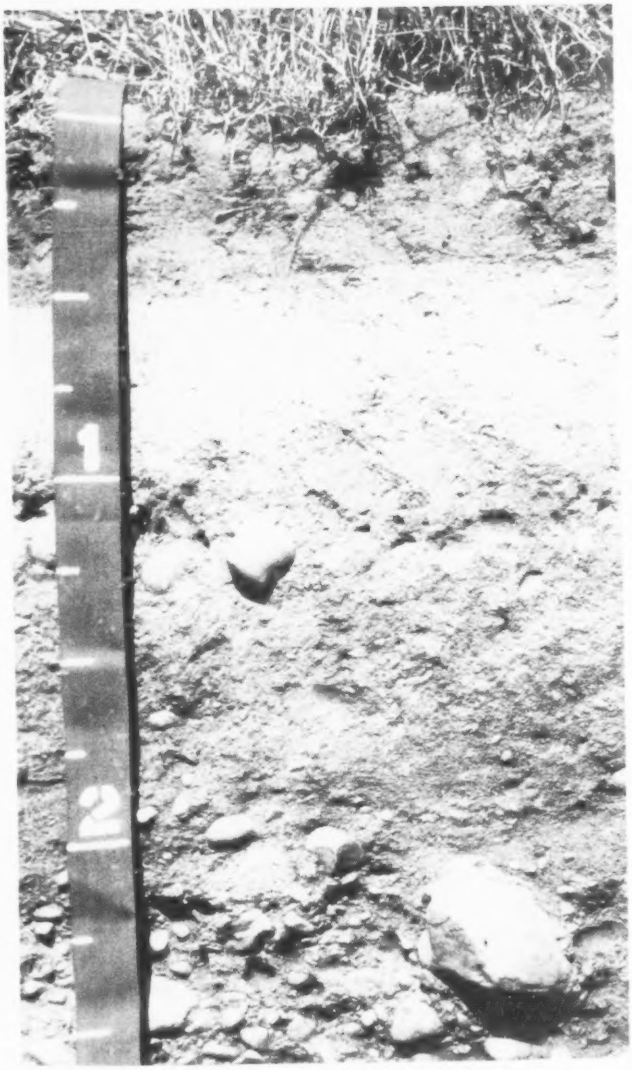

Figure 15.—Profile of a Rosholt soil. Sand and gravel are at a depth of about 24 inches. Depth is marked in feet.

The thickness of the solum ranges from 20 to 40 inches. The depth to stratified sand and gravel ranges from 20 to 36 inches.

The A or Ap horizon and the E horizon are loam or sandy loam. The Ap horizon has value of 3 or 4 and chroma of 2 or 3. The A horizon has value of 2 or 3 and chroma of 1 or 2. The E horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 2 or 3. The Bt horizon has hue of 5YR, 7.5YR, or 10YR and value and chroma of 3 to 5. It is sandy loam or loam. The content of gravel in this horizon ranges from 5 to 15 percent. The 2Bt horizon has hue of 5YR, 7.5YR, or 10YR, value of 3 to 5, and chroma of 3 to 6. It is gravelly sandy loam or gravelly loamy sand. The content of gravel and cobbles in the 2Bt and 2C horizons ranges from 15 to 40 percent. The 2C horizon has hue of 5YR or 7.5YR and value and chroma of 3 to 6.

Santiago Series

The Santiago series consists of deep, well drained, moderately permeable soils on ground moraines. These soils formed in silty deposits and in the underlying loamy glacial till. Slope ranges from 2 to 20 percent.

Typical pedon of Santiago silt loam, 6 to 12 percent slopes, eroded, 50 feet west and 1,200 feet north of the southeast corner of sec. 10, T. 29 N., R. 6 W.

Ap—0 to 7 inches; dark brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate medium granular structure; friable; neutral; abrupt smooth boundary.

E—7 to 9 inches; brown (10YR 5/3) silt loam, very pale brown (10YR 7/3) dry; moderate medium platy structure; friable; neutral; clear smooth boundary.

E/B—9 to 13 inches; brown (10YR 5/3) silt loam (E); moderate medium platy structure; E material makes up about 60 percent of the horizon; dark yellowish brown (10YR 4/4) silt loam (Bt); moderate medium subangular blocky structure; friable; estimated 3 percent gravel; slightly acid; clear smooth boundary.

B/E—13 to 16 inches; dark yellowish brown (10YR 4/4) silt loam (Bt); moderate medium subangular blocky structure; Bt material makes up about 70 percent of the horizon; brown (10YR 5/3) silt loam (E); moderate medium platy structure; friable; estimated 3 percent gravel; slightly acid; clear smooth boundary.

Bt1—16 to 19 inches; dark brown (7.5YR 4/4) silt loam; moderate medium subangular blocky structure; friable; few faint clay films on faces of peds; estimated 3 percent gravel; slightly acid; clear smooth boundary.

2Bt2—19 to 24 inches; dark brown (7.5YR 4/4) loam; moderate medium subangular blocky structure; friable; few faint clay films on faces of peds; estimated 5 percent gravel and 5 percent cobbles; slightly acid; clear smooth boundary.

2BC—24 to 30 inches; reddish brown (5YR 4/4) sandy loam; moderate coarse subangular blocky structure; friable; estimated 5 percent gravel and 5 percent cobbles; medium acid; clear smooth boundary.

2C—30 to 60 inches; dark reddish brown (2.5YR 3/4) sandy loam; massive; firm; estimated 5 percent gravel and 5 percent cobbles; medium acid.

The thickness of the solum ranges from 20 to 36 inches. The thickness of the silty mantle ranges from 15 to 30 inches.

The Ap horizon has value of 3 to 5 and chroma of 1 to 3. The Bt horizon has hue of 7.5YR or 10YR and value and chroma of 4 or 5. The 2Bt horizon has hue of 5YR or 7.5YR and value and chroma of 3 to 5. It is loam, fine sandy loam, or sandy loam. The 2C horizon has hue of 2.5YR or 5YR and value and chroma of 3 to 5. It is sandy loam or loam. The content of gravel and cobbles in this horizon ranges from 10 to 20 percent.

Sattre Series

The Sattre series consists of deep, well drained soils on outwash plains and stream terraces. These soils formed in loamy deposits over sand and gravel. Permeability is moderate or moderately rapid in the subsoil and very rapid in the substratum. Slope ranges from 0 to 3 percent.

Typical pedon of Sattre loam, 0 to 3 percent slopes, 100 feet north and 1,250 feet east of the center of sec. 12, T. 31 N., R. 9 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) loam, grayish brown (10YR 5/2) dry; weak fine subangular blocky structure; friable; slightly acid; abrupt smooth boundary.

E—9 to 12 inches; brown (10YR 5/3) loam; moderate medium platy structure; friable; estimated 2 percent gravel; medium acid; clear wavy boundary.

Bt1—12 to 24 inches; dark brown (7.5YR 4/4) loam; moderate medium subangular blocky structure; friable; few distinct continuous dark brown (7.5YR 3/2) clay films on faces of peds; estimated 5 percent gravel; strongly acid; clear smooth boundary.

Bt2—24 to 30 inches; dark brown (7.5YR 4/4) loam; weak medium subangular blocky structure; friable; common faint continuous dark brown (7.5YR 4/4) clay films on faces of peds; estimated 5 percent gravel; strongly acid; clear smooth boundary.

Bt3—30 to 35 inches; dark brown (7.5YR 4/4) gravelly sandy loam; weak medium subangular blocky structure; friable; few faint discontinuous clay films on faces of peds; some clay flows around pebbles; estimated 35 percent gravel; strongly acid; gradual smooth boundary.

2C—35 to 60 inches; strong brown (7.5YR 5/6) sand and gravel; single grain; loose; medium acid.

The thickness of the solum ranges from 23 to 40 inches. The depth to sand and gravel ranges from 30 to 40 inches.

The A or Ap horizon has value of 2 or 3. The Bt1 and Bt2 horizons have hue of 7.5YR or 10YR and chroma of 3 or 4. They are loam or sandy clay loam. The content of gravel in these horizons is 2 to 10 percent. The Bt3 horizon is sandy loam or gravelly sandy loam. The 2C horizon has chroma of 4 to 6. The content of gravel in this horizon ranges from 20 to 35 percent.

Scott Lake Series

The Scott Lake series consists of deep, moderately well drained soils on outwash plains and stream terraces. These soils formed in loamy deposits underlain by sand and gravel. Permeability is moderate or moderately rapid in the subsoil and rapid or very rapid in the substratum. Slope ranges from 0 to 6 percent.

Typical pedon of Scott Lake loam, 0 to 3 percent slopes, 300 feet north and 2,190 feet east of the southwest corner of sec. 10, T. 30 N., R. 9 W.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) loam, light brownish gray (10YR 6/2) dry; weak fine subangular blocky structure; friable; slightly acid; abrupt smooth boundary.

B/E—8 to 14 inches; dark brown (10YR 4/3) loam (Bt); moderate fine subangular blocky structure; Bt material makes up about 60 percent of the horizon; brown (10YR 5/3) loam, very pale brown (10YR 7/3) dry (E); weak medium platy structure; friable; slightly acid; clear wavy boundary.

Bt1—14 to 26 inches; dark yellowish brown (10YR 4/4) loam; common medium faint dark brown (7.5YR 4/4), common coarse faint brown (10YR 5/3), and few medium prominent strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure; friable; light gray (10YR 7/2) uncoated silt particles and very fine sand grains on vertical faces of peds; estimated 6 percent gravel; common distinct discontinuous clay films on faces of peds; strongly acid; clear wavy boundary.

2Bt2—26 to 36 inches; dark brown (7.5YR 4/4) sandy loam; common medium distinct strong brown (7.5YR 5/8) and few medium distinct grayish brown (10YR 5/2) mottles; weak medium subangular blocky structure; friable; estimated 10 percent gravel; few distinct discontinuous clay films on faces of peds; strongly acid; gradual smooth boundary.

2C—36 to 60 inches; dark brown (7.5YR 4/4) and dark yellowish brown (10YR 4/4) stratified sand and gravel; single grain; loose; slightly acid.

The thickness of the solum ranges from 24 to 40 inches. The depth to stratified sand and gravel ranges from 20 to 36 inches.

The Ap, E, and Bt horizons are sandy loam or loam. The Ap horizon has value of 3 or 4 and chroma of 2 or 3. The E horizon, if it occurs, has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 2 or 3. The Bt horizon has hue of 5YR, 7.5YR, or 10YR, value of 4 or 5, and chroma of 3 or 4. The content of gravel in this horizon is 2 to 10 percent. The 2Bt horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. It is gravelly loamy sand, sandy loam, or gravelly sandy loam. The content of gravel in this horizon ranges from 5 to 25 percent. The 2C horizon has hue of 5YR, 7.5YR, or 10YR and value and chroma of 4 to 6. The content of gravel in this horizon ranges from 20 to 60 percent.

Seaton Series

The Seaton series consists of deep, well drained and moderately well drained soils on uplands and valley fills. These soils formed in silty deposits. Permeability generally is moderate. The substratum is rapidly permeable, however, in areas where it is sandy. Slope ranges from 0 to 25 percent.

Typical pedon of Seaton silt loam, 6 to 12 percent slopes, eroded, 700 feet south and 50 feet east of the northwest corner of sec. 36, T. 28 N., R. 8 W.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak fine subangular blocky structure; friable; medium acid; abrupt smooth boundary.

E—7 to 10 inches; brown (10YR 5/3) silt loam, very pale brown (10YR 7/3) dry; moderate thin platy structure; friable; medium acid; clear wavy boundary.

Bt1—10 to 14 inches; yellowish brown (10YR 5/4) silt loam; moderate fine subangular blocky structure; friable; few distinct clay films on faces of peds; few light gray (10YR 7/2) uncoated silt particles on vertical faces of peds; strongly acid; clear wavy boundary.

Bt2—14 to 36 inches; dark yellowish brown (10YR 4/4) silt loam; moderate medium subangular blocky structure; friable; common distinct discontinuous clay films on faces of peds; few light gray (10YR 7/2) uncoated silt particles on vertical faces of peds; medium acid; clear wavy boundary.

Bt3—36 to 42 inches; yellowish brown (10YR 5/4) silt loam; moderate medium subangular blocky structure; friable; few distinct discontinuous clay films on faces of peds; few light gray (10YR 7/2) uncoated silt particles on vertical faces of peds; medium acid; gradual wavy boundary.

C—42 to 60 inches; yellowish brown (10YR 5/4) silt loam; massive; friable; slightly acid.

The thickness of the solum ranges from 36 to 45 inches. The Ap horizon has value of 4 or 5. The E horizon has value of 4 or 5 and chroma of 2 or 3. The Bt and C horizons have value of 4 or 5 and chroma of 3 or 4. The C horizon typically is silt loam, but in some pedons it is loamy sand or sand.

Seelyeville Series

The Seelyeville series consists of deep, very poorly drained, moderately rapidly permeable soils in depressions on outwash plains and ground moraines.

These soils formed in herbaceous organic material more than 51 inches thick. Slope is 0 to 1 percent.

Typical pedon of Seelyeville muck, 0 to 1 percent slopes, 400 feet north and 150 feet west of the southeast corner of sec. 16, T. 28 N., R. 8 W.

Oe—0 to 4 inches; hemic material, dark brown (7.5YR 3/2) broken face, pressed, and rubbed; about 75 percent fiber, 28 percent rubbed (mainly grasses, sedges, and sphagnum moss); nonsticky; very strongly acid (pH 4.5 in water); clear smooth boundary.

Oa1—4 to 14 inches; sapric material, black (10YR 2/1) broken face, pressed, and rubbed; about 10 percent fiber, 8 percent rubbed; weak very thick platy structure parting to weak medium subangular blocky; slightly sticky; herbaceous fibers; strongly acid (pH 5.5 in water); clear smooth boundary.

Oa2—14 to 38 inches; stratified sapric material, very dark gray (10YR 3/1) and dark brown (7.5YR 3/2) broken face and pressed, very dark brown (10YR 2/2) rubbed; about 15 percent fiber, 10 percent rubbed; weak very thick platy structure; slightly sticky; herbaceous fibers; strongly acid (pH 5.5 in water); clear smooth boundary.

Oa3—38 to 60 inches; sapric material, dark brown (7.5YR 3/2) broken face, pressed, and rubbed; about 25 percent fiber, 10 percent rubbed; massive; slightly sticky; herbaceous fibers; strongly acid (pH 5.5 in water).

The organic material is more than 51 inches thick. It is typically sapric material, but some pedons have layers of hemic and fibric material. The combined thickness of these layers is less than 10 inches. The sapric material has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 or 2.

Shiffer Series

The Shiffer series consists of deep, somewhat poorly drained soils on stream terraces and valley fills. These soils formed in loamy deposits and in the underlying sandy deposits. Permeability is moderate in the upper part of the subsoil and rapid in the substratum. Slope ranges from 0 to 2 percent.

Typical pedon of Shiffer loam, 0 to 2 percent slopes, 1,750 feet west and 500 feet south of the center of sec. 10, T. 30 N., R. 9 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) loam, brown (10YR 5/3) dry; weak medium subangular blocky structure; friable; slightly acid; abrupt smooth boundary.

Bt1—9 to 20 inches; brown (10YR 5/3) loam; common medium distinct dark brown (7.5YR 4/4) and common medium faint grayish brown (10YR 5/2) mottles; weak fine subangular blocky structure; friable; common distinct clay films on faces of peds; medium acid; clear wavy boundary.

Bt2—20 to 27 inches; brown (7.5YR 5/4) loam; common medium faint strong brown (7.5YR 5/6), common medium prominent strong brown (7.5YR 5/8), and common medium distinct light brownish gray (10YR 6/2) mottles; moderate fine subangular blocky structure; friable; common distinct clay films on faces of peds; light gray (10YR 7/2) uncoated silt particles on faces of peds; strongly acid; clear smooth boundary.

2BC—27 to 31 inches; brown (7.5YR 5/4) loamy sand; common medium faint dark brown (7.5YR 4/4) and common medium distinct grayish brown (10YR 5/2) mottles; weak medium subangular blocky structure; very friable; strongly acid; gradual smooth boundary.

2C—31 to 60 inches; yellowish brown (10YR 5/4) sand; common coarse distinct dark brown (7.5YR 4/4) and few coarse faint grayish brown (10YR 5/2) mottles; single grain; loose; medium acid.

The thickness of the solum ranges from 20 to 40 inches. The Ap or A horizon has value of 2 or 3 and chroma of 1 or 2. The Bt1 horizon has value of 4 to 6 and chroma of 3 or 4. The Bt2 horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 or 5. It is loam or sandy clay loam. The 2BC horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 6. It is loamy sand or sandy loam. The 2C horizon has hue of 7.5YR or 10YR, value of 5 to 8, and chroma of 2 to 6. It is loamy sand or sand.

Spencer Series

The Spencer series consists of deep, moderately well drained soils on ground moraines and terminal moraines. These soils formed in silty deposits underlain by sandy loam glacial till. Permeability is moderate in the subsoil. It generally is moderately slow in the substratum. In the gravelly substratum phases, however, it is rapid or very rapid in the lower part of the substratum. Slope ranges from 0 to 12 percent.

Typical pedon of Spencer silt loam, 2 to 6 percent slopes, 100 feet north and 2,200 feet west of the center of sec. 31, T. 31 N., R. 6 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam, pale brown (10YR 6/3) dry; moderate medium granular structure; friable; neutral; abrupt smooth boundary.

E—9 to 12 inches; brown (10YR 5/3) silt loam, very pale brown (10YR 7/3) dry; weak medium platy structure; friable; slightly acid; gradual smooth boundary.

E/B—12 to 15 inches; brown (10YR 5/3) silt loam (E); weak medium platy structure; E material makes up about 60 percent of the horizon; dark yellowish brown (10YR 4/4) silt loam (Bt); weak medium subangular blocky structure; friable; medium acid; clear wavy boundary.

B/E—15 to 20 inches; dark yellowish brown (10YR 4/4) silt loam (Bt); common medium distinct strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; Bt material makes up about 70 percent of the horizon; brown (10YR 5/3) silt loam (E); moderate medium platy structure; friable; strongly acid; clear smooth boundary.

Bt1—20 to 29 inches; dark yellowish brown (10YR 4/4) silt loam; few fine distinct strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; friable; few distinct dark reddish brown (5YR 3/4) clay films on faces of peds; strongly acid; clear smooth boundary.

Bt2—29 to 37 inches; dark brown (7.5YR 4/4) silt loam; common medium faint strong brown (7.5YR 5/6) and common medium distinct strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure; friable; few distinct clay films on faces of peds; very strongly acid; clear smooth boundary.

C1—37 to 42 inches; dark yellowish brown (10YR 4/4) silt loam; common medium prominent strong brown (7.5YR 5/8) mottles; massive; friable; medium acid; clear wavy boundary.

2C2—42 to 60 inches; yellowish red (5YR 4/6) sandy loam; massive; friable; estimated 10 percent gravel; medium acid.

The thickness of the solum ranges from 30 to 40 inches. The thickness of the silty mantle ranges from 30 to 48 inches.

The Ap horizon has value of 3 to 5 and chroma of 2 or 3. The E horizon has value of 4 to 6 and chroma of 2 or 3. The Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 or 4. The 2C horizon has hue of 2.5YR or 5YR and value and chroma of 4 to 6. It typically is sandy loam, but in some pedons it is sand and gravel below a depth of 40 inches.

Tell Series

The Tell series consists of deep, well drained soils on stream terraces and outwash plains. These soils formed in silty and loamy deposits underlain by sandy material. Permeability is moderate in the subsoil and rapid in the substratum. Slope ranges from 1 to 6 percent.

Typical pedon of Tell silt loam, 1 to 6 percent slopes, 200 feet south and 100 feet west of the northeast corner of sec. 18, T. 29 N., R. 9 W.

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak fine subangular blocky structure; friable; neutral; abrupt smooth boundary.

E—9 to 11 inches; brown (10YR 5/3) silt loam, pale brown (10YR 6/3) dry; weak thin platy structure; friable; slightly acid; clear wavy boundary.

BE—11 to 18 inches; dark yellowish brown (10YR 4/4) silt loam; moderate fine subangular blocky structure; friable; slightly acid; clear smooth boundary.

Bt—18 to 30 inches; dark yellowish brown (10YR 4/4) silt loam; moderate medium subangular blocky structure; friable; common distinct discontinuous clay films on faces of peds; strongly acid; clear smooth boundary.

2BC—30 to 35 inches; yellowish brown (10YR 5/4) sandy loam; weak medium subangular blocky structure; friable; strongly acid; clear smooth boundary.

2C—35 to 60 inches; yellowish brown (10YR 5/6) sand; single grain; loose; strongly acid.

The thickness of the solum ranges from 24 to 40 inches. The thickness of the silty mantle ranges from 20 to 36 inches.

The Ap horizon has value of 3 or 4 and chroma of 2 or 3. The E horizon has value of 4 or 5 and chroma of 2 or 3. The Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 or 4. The 2BC horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 3 to 6. It is loam, sandy clay loam, or sandy loam. The 2C horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 8. It is sand or loamy sand.

Vesper Series

The Vesper series consists of deep, poorly drained soils on uplands. These soils formed in thin deposits of silty material and in the underlying material weathered from sandstone interbedded with shale. Permeability is moderately slow in the subsoil and slow in the substratum. Slope ranges from 0 to 2 percent.

Typical pedon of Vesper silt loam, 0 to 2 percent slopes, 1,500 feet south and 100 feet west of the northeast corner of sec. 35, T. 28 N., R. 7 W.

Ap—0 to 7 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; strong medium granular structure; friable; medium acid; abrupt smooth boundary.

E—7 to 12 inches; dark grayish brown (2.5Y 4/2) silt loam; moderate medium platy structure; friable; strongly acid; clear smooth boundary.

2Bg1—12 to 23 inches; dark grayish brown (10YR 4/2) loam; common medium prominent strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure; friable; very strongly acid; clear smooth boundary.

3Bg2—23 to 38 inches; olive gray (5Y 4/2) clay loam; common medium prominent strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; firm; very strongly acid; clear smooth boundary.

4Cg—38 to 60 inches; grayish brown (10YR 5/2), stratified sand and loam; many coarse prominent strong brown (7.5YR 5/6) mottles; single grain and massive; friable; estimated 5 percent sandstone channers 0.5 inch to 3.0 inches long; very strongly acid.

The thickness of the solum ranges from 24 to 40 inches. The thickness of the silty mantle ranges from 10 to 24 inches. The depth to sandstone interbedded with shale ranges from 42 to more than 60 inches.

The Ap horizon has value of 2 or 3 and chroma of 1 or 2. The E horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 or 2. The 2Bg, 3Bg, and 4Cg horizons have hue of 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 1 or 2. They are dominantly loam or clay loam but have strata of sand, sandy clay loam, silty clay, or clay.

Warman Variant

The Warman Variant consists of deep, somewhat poorly drained soils on outwash plains and stream terraces. These soils formed in loamy and sandy deposits underlain by sand and gravel. Permeability is moderately rapid in the subsoil and rapid in the substratum. Slope ranges from 0 to 2 percent.

Typical pedon of Warman Variant sandy loam, 0 to 2 percent slopes, 450 feet east and 1,600 feet south of the northwest corner of sec. 20, T. 28 N., R. 8 W.

Ap—0 to 8 inches; very dark brown (10YR 2/2) sandy loam, dark grayish brown (10YR 4/2) dry; weak medium granular structure; friable; neutral; abrupt smooth boundary.

A—8 to 12 inches; very dark brown (10YR 2/2) sandy loam, dark grayish brown (10YR 4/2) dry; weak medium granular structure; friable; neutral; abrupt smooth boundary.

Bw1—12 to 15 inches; dark reddish brown (5YR 3/4) sandy loam; common medium faint yellowish red (5YR 4/6) and common medium prominent strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; friable; medium acid; clear smooth boundary.

Bw2—15 to 19 inches; dark brown (7.5YR 4/4) sandy loam; common fine distinct brown (7.5YR 5/2) and common medium distinct yellowish red (5YR 5/6) mottles; weak medium subangular blocky structure; friable; estimated 7 percent gravel; medium acid; clear smooth boundary.

Bw3—19 to 24 inches; dark brown (7.5YR 4/4) loamy sand; common medium distinct yellowish red (5YR 5/6) mottles; weak fine subangular blocky structure; friable; estimated 7 percent gravel; medium acid; gradual smooth boundary.

C—24 to 60 inches; yellowish brown (10YR 5/4) and dark yellowish brown (10YR 4/4) sand and gravel; single grain; loose; medium acid.

The thickness of the solum ranges from 20 to 36 inches. The Ap and A horizons have value of 2 or 3 and chroma of 1 or 2. The Bw horizon has hue of 5YR, 7.5YR, or 10YR, value of 3 to 5, and chroma of 4 or 5. It is sandy loam or loamy sand. The content of gravel in this horizon ranges from 5 to 15 percent. The C horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6.

Withee Series

The Withee series consists of deep, somewhat poorly drained, moderately slowly permeable soils on ground moraines. These soils formed in a thin mantle of silty material and in the underlying loamy glacial till. Slope ranges from 1 to 6 percent.

Typical pedon of Withee silt loam, 1 to 6 percent slopes, 2,040 feet south and 300 feet east of the northwest corner of sec. 1, T. 28 N., R. 5 W.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; moderate fine subangular blocky structure; friable; slightly acid; abrupt smooth boundary.

E—8 to 12 inches; pale brown (10YR 6/3) silt loam, very pale brown (10YR 7/3) dry; common medium prominent dark brown (7.5YR 4/4) and yellowish red (5YR 5/8) and few coarse faint light brownish gray (10YR 6/2) mottles; weak medium platy structure; friable; slightly acid; clear wavy boundary.

E/B—12 to 18 inches; pale brown (10YR 6/3) silt loam (E); weak medium platy structure; E material makes up about 60 percent of the horizon; brown (10YR 5/3) silt loam (Bt); few coarse faint light brownish gray (10YR 6/2) and common medium prominent yellowish red (5YR 5/6) and dark brown (7.5YR 4/4) mottles; weak very thick platy structure parting to moderate fine subangular blocky; friable; thin discontinuous clay films on faces of peds; very strongly acid; clear wavy boundary.

B/E—18 to 23 inches; brown (10YR 5/3) silt loam (Bt); common medium prominent yellowish red (5YR 5/6), common medium distinct dark brown (7.5YR 4/4), and few coarse faint light brownish gray (10YR 6/2) mottles; weak thick platy structure parting to moderate fine subangular blocky; Bt material makes up about 70 percent of the horizon; pale brown (10YR 6/3) silt loam (E); weak medium platy structure; friable; common distinct continuous clay films on faces of peds; very strongly acid; clear wavy boundary.

2Bt1—23 to 34 inches; reddish brown (5YR 4/4) loam; few medium distinct brown (7.5YR 5/2) and common medium distinct strong brown (7.5YR 5/6) mottles; weak coarse prismatic structure parting to strong medium subangular blocky; firm; common distinct continuous clay films on faces of peds; light gray (10YR 7/2) uncoated silt particles and very fine sand grains on faces of peds; estimated 10 percent gravel and 1 percent cobbles; very strongly acid; gradual smooth boundary.

2Bt2—34 to 42 inches; reddish brown (5YR 4/4) loam; few medium distinct strong brown (7.5YR 5/6) and brown (7.5YR 5/2) mottles; moderate medium subangular blocky structure; firm; few distinct discontinuous clay films on faces of peds; estimated 10 percent gravel; very strongly acid; gradual smooth boundary.

2C—42 to 60 inches; reddish brown (5YR 4/4) loam; massive; firm; strongly acid.

The thickness of the solum ranges from 24 to 48 inches. The thickness of the silty mantle ranges from 15 to 36 inches.

The Ap or A horizon has value of 3 or 4 and chroma of 2 or 3. The 2Bt horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 2 to 4. It is loam or sandy clay loam. The 2C horizon has hue of 5YR or 7.5YR and value and chroma of 4 or 5.

Formation of the Soils

This section describes the geology and underlying material in Chippewa County, relates the factors of soil formation to the soils in the county, and explains the processes of soil formation.

Geology and Underlying Material

Robert N. Cheetham, Jr., geologist, Soil Conservation Service, helped prepare this section.

Chippewa County is almost equally divided between two Wisconsin geomorphic provinces—the Northern Highland and the Central Plain. The Northern Highland is an ancient peneplain of complexly folded and faulted igneous and metamorphic rocks (granite, rhyolite, chloritic schist, and granodiorite) of Precambrian age. The Central Plain is a dissected landscape of Upper Cambrian age. It overlaps the Precambrian rocks to the north and west. This bedrock is mostly sandstone but includes some siltstone and shale.

A bedrock geology map of Wisconsin shows the rock types in the county and their distribution (*8*). This information is based on previously published and unpublished geologic reports, well logs from a geologic survey, and a limited field check of the outcrops by a Soil Conservation Service geologist.

The bedrock terrain has been modified by continental glaciation. It is covered by Pleistocene deposits, windblown silty deposits, and soils.

The main mineral resources in the county are outwash deposits of sand and gravel. Other mineral resources are peat, glacial clay, and crushed Precambrian igneous or metamorphic rocks, such as traprock and quartzite. Some Upper Cambrian sandstone can be used locally for roadfill. Metallic sulfides, particularly copper and iron, are disseminated in the Precambrian rocks. Bodies of ore could be in the rocks.

Factors of Soil Formation

Soil forms through processes that act on deposited or accumulated geologic material. The characteristics of the soil at any given point are determined by the physical and mineral composition of the parent material, the climate under which the soil material has been accumulated and existed since accumulation, the plant and animal life on and in the soil, the relief and drainage, and the length of time that the forces of soil formation have acted on the soil material (*10*).

Climate and vegetation are active factors of soil formation. They act on the parent material that has accumulated through the weathering or physical disintegration of rocks and slowly change it into a natural body that has genetically related horizons. The effects of climate and of plant and animal life are conditioned by relief. The parent material affects the kind of soil profile that forms and, in some areas, determines it almost entirely. Finally, time is needed for the transformation of the parent material into a soil. Some time is always needed for the differentiation of soil horizons. Usually, a long time is needed for the development of distinct horizons.

The factors of soil formation are so closely interrelated in their effects on the soil that few generalizations can be made regarding the effects of any one factor unless conditions are specified for the other four.

Parent Material

Parent material is the unconsolidated mass in which a soil forms. It largely determines the chemical and mineralogical composition of the soil. Silty deposits or loess, glacial till, and outwash are the dominant kinds of parent material in the county. Lacustrine deposits, organic material, and material weathered from sandstone or interbedded sandstone and shale also are common. Some soils formed in more than one kind of parent material.

Glacial till is unstratified, unsorted glacial debris made up mainly of clay, silt, and sand. It may contain gravel, cobbles, stones, or boulders. Two distinctly different kinds of till are separated by the Cary Moraine in the county. The Cary-age till is dominantly sandy loam, but in some areas it is loamy sand. Amery is an example of a soil that formed in loamy deposits and in the underlying sandy loam or loamy sand till. Freeon, Magnor, and Santiago are examples of soils that formed in silty deposits and in the underlying sandy loam till. The ground moraine southeast of the Cary Moraine is loam till. Loyal and Withee are examples of soils that formed in silty deposits and in the underlying loam till.

Glacial outwash is sand, sand and gravel, or stratified sand and gravel deposited by water flowing from a melting glacier. Antigo, Brill, and Poskin are examples of soils that formed in silty and loamy deposits over stratified or unstratified sand and gravel. Billett, Burkhardt, Rosholt, and Sattre are examples of soils that formed mostly in loamy deposits over sand or stratified or unstratified sand and gravel. Soils that formed in sandy outwash do not have a layer of clay accumulation and show little evidence of subsoil development. Friendship, Meehan, and Menahga are examples.

Lacustrine deposits are mainly silty or loamy but have thin strata of sandy material in some areas. These sediments were deposited in the still water of glacial lakes. Campia, Comstock, and Crystal Lake are examples of soils that formed in silty lacustrine deposits. Plover soils formed in silty and loamy lacustrine deposits. Alban soils formed in loamy lacustrine deposits.

Some of the soils in the county formed in bedrock residuum. Boone soils, for example, formed in sandstone residuum. Eleva and Hixton soils formed in loamy deposits over sandstone residuum. Gale and Northfield soils formed in silty or silty and loamy deposits over sandstone residuum. Humbird and Merrillan are examples of soils that formed in loamy deposits and the underlying silty, loamy, or clayey material weathered from stratified sandstone and shale.

Organic material consists of reeds, sedges, grasses, or woody fragments in various stages of decomposition. Baseman and Markey soils formed in organic material 16 to 51 inches deep over mineral deposits. Greenwood, Lupton, and Seelyeville soils formed in organic material more than 51 inches thick.

Alluvial deposits are of recent origin. The soils that formed in these deposits do not have distinct horizons. Alluvial material is deposited on flood plains or is washed in locally from the higher positions on the landscape. Arenzville and Orion are examples of soils that formed in silty alluvial deposits. Fordum soils formed in loamy and sandy alluvial deposits.

Climate

Climate affects soil formation through its effect on the moisture supply in the soil and on soil temperature. It affects the weathering of rocks and the alteration of the parent material through the mechanical action of freezing and thawing and the chemical action generated by the leaching of water.

Climate indirectly affects soil formation through its effect on plant and animal life. Climatic factors influence the rate of plant growth and thus also influence the accumulation of organic matter in the soil and the level of soil fertility.

Chippewa County has a cool, subhumid continental climate characteristic of the north-central part of the United States. Climatic differences within the county are too small to have resulted in major differences among the soils.

Plant and Animal Life

Living organisms affect soil formation mainly through the effect of vegetation on the accumulation of organic matter in the soil. Bacteria, fungi, and earthworms also affect soil formation. Plant and animal life add organic matter to the soil and translocate plant nutrients from lower to upper layers.

When the first settlers arrived in the survey area, the native vegetation was mixed conifers and hardwoods on the ground and end moraines in the northeastern part of the county, oaks and grasses in the southwestern part, and pine and grasses on the outwash plains along the Chippewa River. The surface layer of the soils that formed under conifers and hardwoods is lighter colored or thinner than that of the other soils in the county. Amery and Withee are examples of soils that formed under hardwoods. Billett and Sattre are examples of soils that formed under oaks and grasses or pine and grasses.

Relief and Drainage

Relief in Chippewa County is affected by geologic and hydrographic factors. Hills, valleys, terraces, and outwash plains formed as a result of rain, wind, rivers, glacial meltwater, and glacial deposition. Where sandstone or shale is the controlling factor of the topography, the resistance of the underlying rocks to weathering has determined the relief.

Drainage characteristics generally are reflected in the color, degree and kind of mottling, or gleying in the soil horizons. Well drained to excessively drained soils have no mottles. Examples are Menahga, Otterholt, and Sattre soils. Moderately well drained soils, such as Loyal and Spencer, have bright colored mottles in the B horizon. Comstock, Magnor, Withee, and other somewhat poorly drained soils have grayish mottles in the B horizon. Cable, Newson, Rib, and other poorly drained or very poorly drained soils are gleyed in the B horizon.

Time

The length of time required for the formation of a given soil depends on the other factors of soil formation. Most of the soils in Chippewa County formed in material deposited at about the time of the last glaciation. They are about 10,000 years old.

Processes of Soil Formation

A combination of basic processes is responsible for horizon differentiation. The main processes are gains, losses, transfers, and transformations. These processes can be active in all soils. Some changes promote horizon differentiation, and others retard it. The nature of the soil at any given point is the net result of all the changes.

The interaction among these soil-forming processes is evident in Antigo soils. These soils formed in silty and loamy deposits over acid, stratified sand and gravel. The silty material was probably deposited during or shortly after the last glaciation. Because these soils are rather high on the landscape and are underlain by porous sand and gravel, they are well drained. The climate favored the growth of trees. Plant and animals contributed to the accumulation of organic matter and organic acids and darkened the surface layer.

As rainwater moved downward through these soils, suspended particles of clay were translocated from the surface soil to the subsoil. This clay occurs as clay films on the faces of peds. As a result of this transfer, the soils have more clay in the lower part of the subsoil than in other horizons.

While these changes occurred in the silty part of the profile, chemical weathering of minerals in the underlying sand and gravel and mixing with the silty deposits gradually changed the lower part of the subsoil to sandy loam. Because of oxidized iron, this layer is darker than the underlying unweathered sand and gravel.

As a result of the soil-formation processes, the Antigo soils have a very dark grayish brown surface layer, tongues of the subsurface layer that extend into the upper part of the subsoil, and clay films and dark brown and reddish brown colors in the middle and lower parts of the subsoil. The underlying sand and gravel is unweathered and has changed little since it was deposited. The processes that were active in the formation of these soils were gains in organic matter in the surface layer, the loss of clay from the upper part of the profile and the subsequent transfer of it to the lower part, and the transformation of iron compounds in the lower part of the subsoil. All of these processes are active in the soils of the county. In some soils certain processes are more active than others. The kinds of parent material and the relief to a great extent have determined the kinds of processes that are dominant in the formation of the soils.

References

(1) American Association of State Highway and Transportation Officials. 1982. Standard specifications for highway materials and methods of sampling and testing. Ed. 13, 2 vols., illus.

(2) American Society for Testing and Materials. 1985. Standard test method for classification of soils for engineering purposes. ASTM Stand. D. 2487.

(3) Chippewa County. 1972. Chippewa County overall economic development plan. 160 pp.

(4) Chippewa County Soil and Water Conservation District. 1975. Resources conservation program: A long-range program for the resources of Chippewa County. 44 pp.

(5) Curtis, John Thomas. 1959. The vegetation of Wisconsin: An ordination of plant communities. Univ. Wis. Press, 657 pp., illus.

(6) Demographic Services Center, State Department of Administration. (No date). Preliminary results, 1980 decennial census, Wisconsin counties and municipalities. 5 pp.

(7) Klingelhoets, A.J., and M.I. Beatty. 1966. What yields from Wisconsin soils. Univ. Wis. Ext. Serv., Spec. Circ. 65, 19 pp.

(8) Mudrey, M.G., Jr., B.A. Brown, and J.K. Greenburg. 1982. Bedrock geology map of Wisconsin. Univ. Wis., Ext. Geol. and Nat. Hist. Surv., 1 map sheet.

(9) Sather, LaVerne M., and C.W. Threinen. 1963. Surface water resources of Chippewa County. Wis. Conserv. Dep., 154 pp.

(10) Simonson, Roy W. 1959. Outline of a generalized theory of soil genesis. Soil Sci. Soc. Am. Proc. 23: 152-156, illus.

(11) Stephenson, Dave, and J.W. Clark. 1974. Wisconsin ground water: An invaluable resource. Univ. Wis., Ext., 20 pp.

(12) United States Department of Agriculture. 1951. Soil survey manual. U.S. Dep. Agric. Handb. 18, 503 pp., illus.

(13) United States Department of Agriculture. 1961. Land capability classification. U.S. Dep. Agric. Handb. 210, 21 pp.

(14) United States Department of Agriculture. 1975. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. Soil Conserv. Serv., U.S. Dep. Agric. Handb. 436, 754 pp., illus.

(15) United Stated Department of Commerce, Bureau of the Census. 1984. 1982 census of agriculture. Vol. 1, Part 49, illus.

(16) West-Central Wisconsin Regional Planners. 1977. Chippewa County community outdoor recreation plan—1977. 95 pp.

(17) Wisconsin Department of Business Development. (No date). Economic profile of Chippewa County. 6 pp.

(18) Wisconsin Department of Natural Resources and United States Department of Agriculture, Forest Service. 1968. Wisconsin forest resource statistics: West-central survey report. 29 pp., illus.

(19) Young, H.L., and S.M. Hindell. 1972. Water resources of Wisconsin, Chippewa River basin. U.S. Geol. Serv., Hydrol. Invest. Atlas HA-386, 4 pp., illus.

Glossary

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Channery soil. A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a channer.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Clayey. Clay, silty clay, or sandy clay.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.5 to 25 centimeters) in diameter.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth, soil. The thickness of the soil over bedrock. In this survey the depth classes are *deep*, more than 40 inches; *moderately deep*, 20 to 40 inches; and *shallow*, 10 to 20 inches.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combinatio of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay in the soil. The soil is not a source of gravel or sand for construction purposes.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Foot slope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Glacial drift (geology). Pulverized and other rock material transported by glacial ice and then deposited. Also the sorted and unsorted material deposited by streams flowing from glaciers.

Glacial outwash (geology). Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

Glacial till (geology). Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.6 centimeters) in diameter.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric and the more decomposed sapric material.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. The major horizons are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, any plowed or disturbed surface layer.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an O, A, or E horizon. The B horizon is in part a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) granular, prismatic, or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Hard, consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon but can be directly below an A or a B horizon.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Lacustrine deposit (geology). Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loamy. Clay loam, sandy clay loam, loam, very fine sandy loam, fine sandy loam, or sandy loam.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. The soil is not strong enough to support loads.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moraine (geology). An accumulation of earth, stones, and other debris deposited by a glacier. Some types are terminal, lateral, medial, and ground.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Muck. Dark colored, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Organic matter. Plant and animal residue in the soil in various stages of decomposition. The content of organic matter is expressed as—

	Percent
Very low	less than 0.5
Low	0.5 to 1.0
Moderately low	1.0 to 2.0
Moderate	2.0 to 4.0
High	4.0 to 8.0
Very high	more than 8.0

Organic soil. A soil that contains 12 to 18 or more percent organic carbon, depending on the content of mineral material, and is more than 16 inches thick.

Outwash plain. A landform of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it is generally low in relief.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rippable. Bedrock or hardpan can be excavated using a single-tooth ripping attachment mounted on a tractor with a 200-300 draw bar horsepower rating.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-size particles.

Sandy. Loamy very fine sand, loamy fine sand, loamy sand, loamy coarse sand, very fine sand, fine sand, sand, or coarse sand.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the substratum. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Silty. Silt, silt loam, or silty clay loam.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. The slope classes in this county are—

	Percent
Nearly level	0 to 2
Gently sloping	2 to 6
Sloping	6 to 12
Moderately steep	12 to 20
Steep	20 to 30
Very steep	more than 30

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows:

	Millimeters
Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to soil blowing and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from about 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terminal moraine. A belt of thick glacial drift that generally marks the termination of important glacial advances.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Tiers. Layers in the control section of organic soils. The organic material is divided into three tiers. The surface tier is the upper 12 inches, the subsurface tier is the next 24 inches, and the bottom tier is the lower 16 inches.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence and root penetration.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Upland (geology). Land at a higher elevation, in general than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but occurring in such a limited geographic area that creation of a new series is not justified.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

(Recorded in the period 1951-81 at Holcombe, Wisconsin)

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January-----	21.6	0.1	10.9	44	-36	0	0.92	0.28	1.44	3	11.5
February----	28.2	4.2	16.2	49	-32	0	.80	.20	1.28	3	7.5
March-------	39.1	17.1	28.1	66	-21	0	1.56	.67	2.31	4	8.5
April-------	56.3	32.8	44.6	84	13	33	2.97	1.75	4.05	6	1.6
May---------	69.7	43.7	56.7	88	26	244	4.06	2.47	5.48	8	.0
June--------	77.8	53.0	65.4	93	35	462	4.83	3.21	6.30	9	.0
July--------	82.3	57.6	70.0	94	43	620	4.15	2.68	5.48	7	.0
August------	79.7	55.4	67.6	93	37	546	4.61	2.49	6.47	8	.0
September---	70.7	47.0	58.9	90	28	272	4.23	1.78	6.30	7	.0
October-----	59.8	37.4	48.6	82	16	100	2.45	.99	3.67	5	.0
November----	41.5	24.1	32.8	64	-6	0	1.63	.56	2.51	4	4.2
December----	27.2	9.6	18.4	48	-25	0	1.12	.48	1.66	3	9.7
Yearly:											
Average---	54.5	31.8	43.2	---	---	---	---	---	---	---	---
Extreme---	---	---	---	95	-37	---	---	---	---	---	---
Total-----	---	---	---	---	---	2,277	33.33	27.49	38.93	67	43.0

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50 degrees F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

(Recorded in the period 1951-81 at Holcombe, Wisconsin)

Probability	Temperature		
	24° F or lower	28° F or lower	32° F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	May 1	May 14	June 2
2 years in 10 later than--	Apr. 27	May 9	May 28
5 years in 10 later than--	Apr. 18	Apr. 30	May 17
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 7	Sept. 23	Sept. 11
2 years in 10 earlier than--	Oct. 12	Sept. 28	Sept. 15
5 years in 10 earlier than--	Oct. 22	Oct. 9	Sept. 23

TABLE 3.--GROWING SEASON

(Recorded in the period 1951-81 at Holcombe, Wisconsin)

Probability	Daily minimum temperature during growing season		
	Higher than 24° F	Higher than 28° F	Higher than 32° F
	Days	Days	Days
9 years in 10	163	140	106
8 years in 10	171	147	113
5 years in 10	186	161	128
2 years in 10	201	174	143
1 year in 10	209	181	151

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
AfB	Alban fine sandy loam, 2 to 6 percent slopes	4,955	0.7
AfC	Alban fine sandy loam, 6 to 12 percent slopes	1,650	0.2
AgB	Almena silt loam, 1 to 6 percent slopes	25,170	3.8
AlB	Amery sandy loam, 2 to 6 percent slopes	4,855	0.7
AlC	Amery sandy loam, 6 to 12 percent slopes	26,015	4.0
AlD	Amery sandy loam, 12 to 25 percent slopes	39,090	5.9
AlF	Amery sandy loam, 25 to 45 percent slopes	1,840	0.3
AnB	Antigo silt loam, 1 to 6 percent slopes	1,675	0.3
AnC2	Antigo silt loam, 6 to 12 percent slopes, eroded	1,090	0.2
AoA	Arenzville silt loam, 0 to 3 percent slopes	1,185	0.2
ApB	Arland sandy loam, 2 to 6 percent slopes	3,080	0.5
ApC2	Arland sandy loam, 6 to 12 percent slopes, eroded	5,210	0.8
ApD2	Arland sandy loam, 12 to 20 percent slopes, eroded	1,525	0.2
AsB	Arland loam, 2 to 6 percent slopes	2,995	0.4
AsC2	Arland loam, 6 to 12 percent slopes, eroded	3,140	0.5
AsD2	Arland loam, 12 to 20 percent slopes, eroded	790	0.1
Au	Auburndale silt loam, 0 to 2 percent slopes	10,860	1.6
Ba	Barronett silt loam, 0 to 2 percent slopes	7,150	1.1
Bb	Barronett mucky silt loam, ponded, 0 to 2 percent slopes	3,870	0.6
Be	Beseman muck, 0 to 1 percent slopes	9,640	1.4
BlA	Billett sandy loam, 0 to 2 percent slopes	2,890	0.4
BlB	Billett sandy loam, 2 to 6 percent slopes	13,420	2.0
BlC2	Billett sandy loam, 6 to 12 percent slopes, eroded	1,235	0.2
BmA	Billett sandy loam, moderately well drained, 0 to 3 percent slopes	2,755	0.4
BoE	Boone fine sand, 20 to 45 percent slopes	4,610	0.7
BpA	Brill silt loam, 0 to 3 percent slopes	1,595	0.2
BuA	Burkhardt sandy loam, 0 to 3 percent slopes	9,380	1.4
Cb	Cable silt loam, 0 to 2 percent slopes	10,850	1.6
CdB	Campia silt loam, 2 to 6 percent slopes	1,380	0.2
CdC2	Campia silt loam, 6 to 12 percent slopes, eroded	905	0.1
CdD2	Campia silt loam, 12 to 20 percent slopes, eroded	370	0.1
CeA	Caryville sandy loam, 0 to 3 percent slopes	1,895	0.3
CkA	Chetek sandy loam, 0 to 2 percent slopes	4,160	0.6
CkB	Chetek sandy loam, 2 to 6 percent slopes	6,515	1.0
CkC2	Chetek sandy loam, 6 to 12 percent slopes, eroded	5,375	0.8
CkD2	Chetek-Mahtomedi complex, 12 to 25 percent slopes, eroded	7,485	1.1
CkE	Chetek-Mahtomedi complex, 25 to 40 percent slopes	2,360	0.4
Cm	Comstock silt loam, 0 to 2 percent slopes	6,210	0.9
CuA	Crystal Lake silt loam, 0 to 3 percent slopes	2,500	0.4
ElB	Eleva sandy loam, 2 to 6 percent slopes	3,480	0.5
ElC2	Eleva sandy loam, 6 to 12 percent slopes, eroded	4,815	0.7
ElD2	Eleva sandy loam, 12 to 20 percent slopes, eroded	1,025	0.2
EmB	Elkmound loam, 2 to 6 percent slopes	1,095	0.2
EmC2	Elkmound loam, 6 to 12 percent slopes, eroded	4,260	0.6
EmD2	Elkmound loam, 12 to 20 percent slopes, eroded	4,220	0.6
EmE	Elkmound loam, 20 to 45 percent slopes	4,040	0.6
Eo	Elm Lake loamy sand, 0 to 2 percent slopes	3,540	0.5
FaB	Fallcreek sandy loam, 2 to 6 percent slopes	8,295	1.2
FbB	Flambeau loam, 2 to 6 percent slopes	7,635	1.1
FbC2	Flambeau loam, 6 to 12 percent slopes, eroded	1,195	0.2
Fm	Fordum loam, 0 to 2 percent slopes	11,825	1.8
FnB	Freeon silt loam, 2 to 6 percent slopes	25,550	3.9
FnC2	Freeon silt loam, 6 to 12 percent slopes, eroded	4,650	0.7
FrA	Friendship loamy sand, 0 to 3 percent slopes	4,625	0.7
GaB	Gale silt loam, 2 to 6 percent slopes	965	0.1
GaC2	Gale silt loam, 6 to 12 percent slopes, eroded	3,455	0.5
GaD2	Gale silt loam, 12 to 20 percent slopes, eroded	2,135	0.3
Gr	Greenwood peat, 0 to 1 percent slopes	13,345	2.0
Ha	Halder loam, 0 to 2 percent slopes	3,335	0.5
HeB	Hiles silt loam, 2 to 6 percent slopes	1,280	0.2
HfB	Hiles Variant loam, 2 to 8 percent slopes	345	0.1
HnB	Hixton loam, 2 to 6 percent slopes	2,860	0.4
HnC2	Hixton loam, 6 to 12 percent slopes, eroded	1,455	0.2
HuB	Humbird sandy loam, 2 to 6 percent slopes	4,990	0.7
HuC2	Humbird sandy loam, 6 to 12 percent slopes, eroded	715	0.1

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
KeB	Kert silt loam, 1 to 6 percent slopes	5,050	0.8
La	Lows loam, 0 to 2 percent slopes	1,960	0.3
LoB	Loyal silt loam, 2 to 6 percent slopes	3,495	0.5
LoC2	Loyal silt loam, 6 to 12 percent slopes, eroded	1,615	0.2
Lp	Lupton muck, 0 to 1 percent slopes	17,360	2.6
MbB	Magnor silt loam, 1 to 6 percent slopes	26,470	4.1
McB	Magnor silt loam, 1 to 6 percent slopes, stony	785	0.1
MdB	Mahtomedi loamy sand, 2 to 6 percent slopes	3,470	0.5
MdC	Mahtomedi loamy sand, 6 to 12 percent slopes	2,330	0.3
Me	Markey muck, 0 to 1 percent slopes	6,360	1.0
Mh	Meehan loamy sand, 0 to 2 percent slopes	3,360	0.5
MkB	Menahga loamy sand, 0 to 6 percent slopes	28,020	4.2
MkC	Menahga loamy sand, 6 to 12 percent slopes	3,605	0.5
MlA	Meridian loam, 0 to 2 percent slopes	1,800	0.3
MlB	Meridian loam, 2 to 6 percent slopes	3,870	0.6
MmA	Meridian loam, moderately well drained, 0 to 3 percent slopes	2,080	0.3
MrB	Merrillan sandy loam, 1 to 6 percent slopes	6,395	1.0
Mu	Minocqua loam, 0 to 2 percent slopes	4,955	0.7
MvA	Moundville loamy sand, 0 to 3 percent slopes	1,290	0.2
Na	Newson loamy sand, 0 to 2 percent slopes	2,950	0.4
NtB	Northfield silt loam, 2 to 6 percent slopes	1,505	0.2
NtC2	Northfield silt loam, 6 to 12 percent slopes, eroded	1,950	0.3
NtD2	Northfield silt loam, 12 to 20 percent slopes, eroded	1,205	0.2
Oe	Oesterle sandy loam, 0 to 2 percent slopes	5,010	0.8
Or	Orion silt loam, 0 to 2 percent slopes	2,145	0.3
OsC2	Otterholt silt loam, 6 to 12 percent slopes, eroded	1,745	0.3
Pc	Pits, gravel	1,285	0.2
PdB	Plainbo loamy sand, 2 to 6 percent slopes	1,205	0.2
PdC	Plainbo loamy sand, 6 to 12 percent slopes	2,950	0.4
PdD	Plainbo loamy sand, 12 to 20 percent slopes	2,840	0.4
Pv	Plover silt loam, 0 to 2 percent slopes	1,690	0.3
Px	Poskin silt loam, 0 to 2 percent slopes	3,475	0.5
Rb	Rib silt loam, 0 to 2 percent slopes	3,335	0.5
Rc	Rib mucky silt loam, ponded, 0 to 2 percent slopes	1,325	0.2
RfA	Richford loamy sand, 0 to 3 percent slopes	1,080	0.2
RoA	Rosholt sandy loam, 0 to 2 percent slopes	5,135	0.8
RoB	Rosholt sandy loam, 2 to 6 percent slopes	5,590	0.8
RoC2	Rosholt sandy loam, 6 to 12 percent slopes, eroded	3,560	0.5
RpA	Rosholt loam, 0 to 2 percent slopes	2,155	0.3
RpB	Rosholt loam, 2 to 6 percent slopes	3,635	0.5
RpC2	Rosholt loam, 6 to 12 percent slopes, eroded	520	0.1
SaB	Santiago silt loam, 2 to 6 percent slopes	2,665	0.4
SaC2	Santiago silt loam, 6 to 12 percent slopes, eroded	7,520	1.1
SaD2	Santiago silt loam, 12 to 20 percent slopes, eroded	2,195	0.3
SbA	Sattre loam, 0 to 3 percent slopes	5,980	0.9
ScB	Scott Lake sandy loam, 1 to 6 percent slopes	4,030	0.6
SdA	Scott Lake loam, 0 to 3 percent slopes	3,055	0.5
SeB	Seaton silt loam, 2 to 6 percent slopes	3,400	0.5
SeC2	Seaton silt loam, 6 to 12 percent slopes, eroded	7,970	1.2
SeD2	Seaton silt loam, 12 to 25 percent slopes, eroded	2,630	0.4
SfA	Seaton silt loam, moderately well drained, 0 to 3 percent slopes	785	0.1
SgA	Seaton silt loam, sandy substratum, 0 to 2 percent slopes	1,250	0.2
SgB	Seaton silt loam, sandy substratum, 2 to 6 percent slopes	3,445	0.5
Sm	Seelyeville muck, 0 to 1 percent slopes	6,555	1.0
So	Shiffer loam, 0 to 2 percent slopes	3,965	0.6
SrB	Spencer silt loam, 2 to 6 percent slopes	27,180	4.2
SrC2	Spencer silt loam, 6 to 12 percent slopes, eroded	3,645	0.5
SsA	Spencer silt loam, gravelly substratum, 0 to 2 percent slopes	430	0.1
SsB	Spencer silt loam, gravelly substratum, 2 to 6 percent slopes	2,090	0.3
TeB	Tell silt loam, 1 to 6 percent slopes	600	0.1
Ud	Udifluvents, loamy, nearly level	1,190	0.2
Ve	Vesper silt loam, 0 to 2 percent slopes	4,420	0.7
Wb	Warman Variant sandy loam, 0 to 2 percent slopes	685	0.1
WeB	Withee silt loam, 1 to 6 percent slopes	7,785	1.2
	Water	15,629	2.3
	Total	666,464	100.0

TABLE 5.--PRIME FARMLAND

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland. If a soil is prime farmland only under certain conditions, the conditions are specified in parentheses after the soil name)

Map symbol	Soil name
AfB	Alban fine sandy loam, 2 to 6 percent slopes
AgB	Almena silt loam, 1 to 6 percent slopes (where drained)
AlB	Amery sandy loam, 2 to 6 percent slopes
AnB	Antigo silt loam, 1 to 6 percent slopes
AoA	Arenzville silt loam, 0 to 3 percent slopes
ApB	Arland sandy loam, 2 to 6 percent slopes
AsB	Arland loam, 2 to 6 percent slopes
Ba	Barronett silt loam, 0 to 2 percent slopes (where drained)
BlA	Billett sandy loam, 0 to 2 percent slopes
BlB	Billett sandy loam, 2 to 6 percent slopes
BmA	Billett sandy loam, moderately well drained, 0 to 3 percent slopes
BpA	Brill silt loam, 0 to 3 percent slopes
CdB	Campia silt loam, 2 to 6 percent slopes
Cm	Comstock silt loam, 0 to 2 percent slopes (where drained)
CuA	Crystal Lake silt loam, 0 to 3 percent slopes
ElB	Eleva sandy loam, 2 to 6 percent slopes
FaB	Fallcreek sandy loam, 2 to 6 percent slopes
FbB	Flambeau loam, 2 to 6 percent slopes
FnB	Freeon silt loam, 2 to 6 percent slopes
GaB	Gale silt loam, 2 to 6 percent slopes
Ha	Halder loam, 0 to 2 percent slopes (where drained)
HeB	Hiles silt loam, 2 to 6 percent slopes
HnB	Hixton loam, 2 to 6 percent slopes
KeB	Kert silt loam, 1 to 6 percent slopes
La	Lows loam, 0 to 2 percent slopes (where drained)
LoB	Loyal silt loam, 2 to 6 percent slopes
MbB	Magnor silt loam, 1 to 6 percent slopes
MlA	Meridian loam, 0 to 2 percent slopes
MlB	Meridian loam, 2 to 6 percent slopes
MmA	Meridian loam, moderately well drained, 0 to 3 percent slopes
MrB	Merrillan sandy loam, 1 to 6 percent slopes
Oe	Oesterle sandy loam, 0 to 2 percent slopes (where drained)
Or	Orion silt loam, 0 to 2 percent slopes (where protected from flooding or not frequently flooded during the growing season)
Pv	Plover silt loam, 0 to 2 percent slopes (where drained)
Px	Poskin silt loam, 0 to 2 percent slopes (where drained)
Rb	Rib silt loam, 0 to 2 percent slopes (where drained)
RoA	Rosholt sandy loam, 0 to 2 percent slopes
RoB	Rosholt sandy loam, 2 to 6 percent slopes
RpA	Rosholt loam, 0 to 2 percent slopes
RpB	Rosholt loam, 2 to 6 percent slopes
SaB	Santiago silt loam, 2 to 6 percent slopes
SbA	Sattre loam, 0 to 3 percent slopes
ScB	Scott Lake sandy loam, 1 to 6 percent slopes
SdA	Scott Lake loam, 0 to 3 percent slopes
SeB	Seaton silt loam, 2 to 6 percent slopes
SfA	Seaton silt loam, moderately well drained, 0 to 3 percent slopes
SgA	Seaton silt loam, sandy substratum, 0 to 2 percent slopes
SgB	Seaton silt loam, sandy substratum, 2 to 6 percent slopes
So	Shiffer loam, 0 to 2 percent slopes (where drained)
SrB	Spencer silt loam, 2 to 6 percent slopes
SsA	Spencer silt loam, gravelly substratum, 0 to 2 percent slopes
SsB	Spencer silt loam, gravelly substratum, 2 to 6 percent slopes
TeB	Tell silt loam, 1 to 6 percent slopes
WeB	Withee silt loam, 1 to 6 percent slopes

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Soil name and map symbol	Land capability	Corn	Corn silage	Oats	Bromegrass-alfalfa hay	Timothy-red clover hay	Kentucky bluegrass	Soybeans
		Bu	Tons	Bu	Tons	Tons	AUM*	Bu
AfB Alban	IIe	85	13	70	3.5	---	2.1	28
AfC Alban	IIIe	80	12	65	3.0	---	1.7	24
AgB Almena	IIe	85	13	75	---	4.5	3.5	30
AlB Amery	IIe	80	12	75	4.0	---	2.4	28
AlC Amery	IIIe	75	11	70	4.0	---	2.1	24
AlD Amery	IVe	70	10	60	3.5	---	1.7	---
AlF Amery	VIIe	---	---	---	---	---	1.0	---
AnB Antigo	IIe	90	14	80	4.3	---	3.5	32
AnC2 Antigo	IIIe	80	13	70	4.0	---	3.0	28
AoA Arenzville	IIw	115	19	80	5.0	---	4.7	38
ApB Arland	IIe	80	12	70	4.0	---	2.5	28
ApC2 Arland	IIIe	70	10	60	3.5	---	2.1	24
ApD2 Arland	IVe	60	9	50	2.7	---	1.6	---
AsB Arland	IIe	90	13	75	4.0	---	2.5	32
AsC2 Arland	IIIe	80	12	70	3.5	---	2.1	28
AsD2 Arland	IVe	70	11	60	2.7	---	1.6	---
Au Auburndale	VIw	---	---	---	---	---	---	---
Ba Barronett	IIIw	80	13	70	---	3.5	2.6	28
Bb Barronett	VIw	---	---	---	---	---	---	---

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Corn silage	Oats	Bromegrass-alfalfa hay	Timothy-red clover hay	Kentucky bluegrass	oybeans
		Bu	Tons	Bu	Tons	Tons	AUM*	Bu
Be Beseman	VIIw	---	---	---	---	---	---	---
BlA, BlB Billett	IIIs	75	11	60	3.5	---	2.1	28
BlC2 Billett	IIIe	70	10	55	3.0	---	2.0	24
BmA Billett	IIIs	80	12	65	3.5	---	2.1	28
BoE Boone	VIIs	---	---	---	---	---	1.0	---
BpA Brill	IIs	90	14	80	4.3	---	3.6	30
BuA Burkhardt	IIIs	70	11	60	3.0	---	1.8	26
Cb Cable	VIw	---	---	---	---	---	1.6	---
CdB Campia	IIe	95	15	80	5.0	---	4.0	32
CdC2 Campia	IIIe	85	13	65	4.3	---	3.7	26
CdD2 Campia	IVe	75	11	60	4.0	---	3.6	---
CeA Caryville	IIIw	65	10	60	3.0	---	1.8	26
CkA Chetek	IIIs	70	11	60	3.2	---	2.0	28
CkB Chetek	IIIe	70	11	60	3.0	---	1.8	26
CkC2 Chetek	IVe	62	10	55	2.3	---	1.2	20
CkD2 Chetek-Mahtomedi	VIe	---	---	45	2.0	---	0.9	---
CkE Chetek-Mahtomedi	VIIe	---	---	---	---	---	0.8	---
Cm Comstock	IIw	85	13	75	---	4.5	3.7	30
CuA Crystal Lake	I	110	18	80	5.0	---	4.0	32
ElB Eleva	IIIs	75	12	65	4.0	---	2.6	28

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Corn silage	Oats	Bromegrass-alfalfa hay	Timothy-red clover hay	Kentucky bluegrass	Soybeans
		Bu	Tons	Bu	Tons	Tons	AUM*	Bu
ElC2----------- Eleva	IIIe	70	11	60	3.5	---	2.4	27
ElD2----------- Eleva	IVe	60	10	55	3.0	---	2.0	---
EmB------------ Elkmound	IIIe	60	10	55	3.0	---	1.8	22
EmC2----------- Elkmound	IVe	50	8	50	2.5	---	1.4	22
EmD2----------- Elkmound	VIe	---	---	50	2.5	---	1.0	---
EmE------------ Elkmound	VIIe	---	---	---	---	---	---	---
Eo------------- Elm Lake	VIw	---	---	---	---	---	0.7	---
FaB------------ Fallcreek	IIe	75	12	65	4.0	3.5	3.3	27
FbB------------ Flambeau	IIe	80	13	70	4.0	---	3.5	28
FbC2----------- Flambeau	IIIe	75	12	65	4.0	---	3.0	26
Fm------------- Fordum	VIw	---	---	---	---	---	3.0	---
FnB------------ Freeon	IIe	80	12	80	4.3	---	3.3	28
FnC2----------- Freeon	IIIe	75	11	66	4.0	---	2.6	21
FrA------------ Friendship	IVs	50	8	55	2.5	---	1.3	22
GaB------------ Gale	IIe	90	14	75	4.5	---	3.3	32
GaC2----------- Gale	IIIe	85	13	65	4.3	---	2.8	26
GaD2----------- Gale	IVe	70	11	55	3.8	---	2.4	---
Gr------------- Greenwood	VIIw	---	---	---	---	---	---	---
Ha------------- Halder	IIw	80	12	70	---	4.0	3.3	28
HeB------------ Hiles	IIe	80	12	70	4.0	---	2.5	26

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Corn silage	Oats	Bromegrass-alfalfa hay	Timothy-red clover hay	Kentucky bluegrass	Soybeans
		Bu	Tons	Bu	Tons	Tons	AUM*	Bu
HfB------------- Hiles Variant	IIe	80	13	70	4.0	---	3.0	25
HnB------------- Hixton	IIe	90	13	75	4.0	---	3.0	28
HnC2------------ Hixton	IIIe	80	12	70	4.0	---	2.8	22
HuB------------- Humbird	IIIe	60	10	60	3.5	---	2.0	23
HuC2------------ Humbird	IVe	45	7	45	2.9	---	2.0	20
KeB------------- Kert	IIe	75	12	65	---	4.0	3.3	26
La-------------- Lows	IIw	75	11	65	---	3.0	2.5	28
LoB------------- Loyal	IIe	90	14	75	4.5	---	3.5	30
LoC2------------ Loyal	IIIe	85	13	70	4.2	---	3.2	26
Lp-------------- Lupton	VIw	---	---	---	---	---	---	---
MbB------------- Magnor	IIe	80	12	75	---	4.5	3.2	28
McB------------- Magnor	VIs	---	---	---	---	---	3.0	---
MdB, MdC-------- Mahtomedi	IVs	50	7	40	2.1	---	1.2	18
Me-------------- Markey	VIw	---	---	---	---	---	---	---
Mh-------------- Meehan	IVw	50	8	50	---	2.5	1.3	20
MkB, MkC-------- Menahga	IVs	45	7	40	2.2	---	1.0	18
MlA------------- Meridian	IIs	90	15	70	4.0	---	3.0	32
MlB------------- Meridian	IIe	85	13	70	4.0	---	2.8	30
MmA------------- Meridian	IIs	90	15	70	4.0	---	3.0	32
MrB------------- Merrillan	IIIe	65	11	60	---	3.2	1.8	24

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Corn silage	Oats	Bromegrass-alfalfa hay	Timothy-red clover hay	Kentucky bluegrass	Soybeans
		Bu	Tons	Bu	Tons	Tons	AUM*	Bu
Mu----------------- Minocqua	VIw	---	---	---	---	---	2.5	---
MvA---------------- Moundville	IVs	55	9	60	2.5	---	1.5	24
Na----------------- Newson	VIw	---	---	---	---	---	1.0	---
NtB---------------- Northfield	IIIe	65	11	60	3.0	---	1.8	25
NtC2--------------- Northfield	IVe	55	8	52	2.7	---	1.2	---
NtD2--------------- Northfield	VIe	---	---	50	2.5	---	1.0	---
Oe----------------- Oesterle	IIw	70	11	65	---	3.3	2.5	24
Or----------------- Orion	IIIw	80	12	60	---	3.2	3.4	26
OsC2--------------- Otterholt	IIIe	85	13	80	4.5	---	3.8	28
Pc**. Pits								
PdB---------------- Plainbo	IVs	45	7	40	2.2	---	1.2	18
PdC---------------- Plainbo	VIs	45	7	40	2.2	---	1.1	16
PdD---------------- Plainbo	VIIs	---	---	---	---	---	0.7	---
Pv----------------- Plover	IIw	80	12	70	---	3.5	3.0	28
Px----------------- Poskin	IIw	85	13	80	---	4.0	3.5	30
Rb----------------- Rib	IIw	85	13	75	---	3.0	3.5	28
Rc----------------- Rib	VIw	---	---	---	---	---	---	---
RfA---------------- Richford	IIIs	55	9	55	3.0	---	1.7	22
RoA---------------- Rosholt	IIs	75	12	70	3.5	---	2.7	30
RoB---------------- Rosholt	IIe	75	12	70	3.5	---	2.5	28

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Corn silage	Oats	Bromegrass-alfalfa hay	Timothy-red clover hay	Kentucky bluegrass	Soybeans
		Bu	Tons	Bu	Tons	Tons	AUM*	Bu
RoC2------------ Rosholt	IIIe	62	11	55	3.2	---	2.0	24
RpA------------- Rosholt	IIs	85	13	75	4.0	---	3.0	32
RpB------------- Rosholt	IIe	80	12	70	4.0	---	3.0	30
RpC2------------ Rosholt	IIIe	75	11	60	3.5	---	2.8	26
SaB------------- Santiago	IIe	85	13	80	4.5	---	4.0	30
SaC2------------ Santiago	IIIe	80	12	75	4.0	---	3.7	24
SaD2------------ Santiago	IVe	70	10	60	3.5	---	3.3	---
SbA------------- Sattre	IIs	85	13	74	4.0	---	3.7	32
ScB------------- Scott Lake	IIe	75	11	70	3.5	---	3.0	26
SdA------------- Scott Lake	IIs	80	12	75	4.0	---	3.5	28
SeB------------- Seaton	IIe	115	19	80	5.0	---	4.1	35
SeC2------------ Seaton	IIIe	110	18	75	4.5	---	4.0	33
SeD2------------ Seaton	IVe	100	16	65	4.2	---	3.7	29
SfA, SgA-------- Seaton	I	120	20	80	5.0	---	4.5	35
SgB------------- Seaton	IIe	110	18	75	5.0	---	4.5	35
Sm-------------- Seelyeville	VIw	---	---	---	---	---	---	--
So-------------- Shiffer	IIw	80	12	75	---	4.0	3.3	2
SrB------------- Spencer	IIe	85	13	75	4.5	---	4.0	3
SrC2------------ Spencer	IIIe	73	9	68	4.2	---	3.4	2
SsA------------- Spencer	I	100	18	85	4.5	---	4.3	3

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Corn silage	Oats	Bromegrass-alfalfa hay	Timothy-red clover hay	Kentucky bluegrass	Soybeans
		Bu	Tons	Bu	Tons	Tons	AUM*	Bu
SsB-------------------- Spencer	IIe	90	15	80	4.5	---	4.0	30
TeB-------------------- Tell	IIe	90	15	75	4.5	---	3.6	30
Ud--------------------- Udifluvents	VIs	---	---	---	---	---	---	---
Ve--------------------- Vesper	VIw	---	---	---	---	---	2.0	---
Wb--------------------- Warman Variant	IIIw	70	11	60	3.5	---	3.0	26
WeB-------------------- Withee	IIe	85	13	75	---	4.5	3.7	28

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

** See description of the map unit for composition and behavior characteristics of the map unit.

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TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available)

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Volume*	
AfB, AfC	3A	Slight	Slight	Slight	Slight	Sugar maple	60	38	Red pine, eastern white pine, white spruce.
Alban						American basswood	---	---	
						Yellow birch	---	---	
AgB	3W	Slight	Moderate	Slight	Moderate	Sugar maple	64	40	White spruce, red pine, eastern white pine, red maple, black spruce.
Almena						American basswood	68	63	
						Red maple	63	39	
						Quaking aspen	---	---	
AlB	4A	Slight	Slight	Slight	Slight	Northern red oak	65	59	Red pine, eastern white pine, white spruce, jack pine.
Amery						Red maple	---	---	
						White oak	---	---	
						White ash	---	---	
						American basswood	---	---	
						Sugar maple	---	---	
						Quaking aspen	---	---	
AlC	4A	Slight	Slight	Slight	Slight	Northern red oak	64	57	Red pine, eastern white pine, white spruce, jack pine.
Amery						Quaking aspen	---	---	
						White oak	---	---	
						White ash	---	---	
						American basswood	---	---	
						Red maple	---	---	
						Sugar maple	---	---	
AlD, AlF	4R	Moderate	Moderate	Slight	Slight	Northern red oak	64	57	Red pine, eastern white pine, white spruce, jack pine.
Amery						Quaking aspen	---	---	
						White oak	---	---	
						White ash	---	---	
						American basswood	---	---	
						Red maple	---	---	
						Sugar maple	---	---	
AnB, AnC2	3A	Slight	Slight	Slight	Slight	Sugar maple	66	41	Eastern white pine, red pine, white spruce.
Antigo						American basswood	69	64	
						Northern red oak	---	---	
						Eastern white pine	---	---	
						Yellow birch	71	44	
						White ash	74	72	
						Bigtooth aspen	---	---	
						Quaking aspen	---	---	
AoA	4A	Slight	Slight	Slight	Slight	Northern red oak	65	59	Red pine, eastern white pine, white spruce, northern red oak, black walnut.
Arenzville						Bur oak	---	---	
						Silver maple	---	---	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Volume*	
ApB, ApC2-------- Arland	4A	Slight	Slight	Slight	Slight	Northern red oak---- White oak----------- Red maple----------- Sugar maple---------	65 --- --- ---	59 --- --- ---	Red pine, eastern white pine, white spruce.
ApD2------------- Arland	4R	Moderate	Moderate	Slight	Slight	Northern red oak---- White oak----------- Red maple----------- Sugar maple---------	65 --- --- ---	59 --- --- ---	Red pine, eastern white pine, white spruce.
AsB, AsC2-------- Arland	4A	Slight	Slight	Slight	Slight	Northern red oak---- White oak----------- Red maple----------- Sugar maple---------	65 --- --- ---	59 --- --- ---	Red pine, eastern white pine, white spruce.
AsD2------------- Arland	4R	Moderate	Moderate	Slight	Slight	Northern red oak---- White oak----------- Red maple----------- Sugar maple---------	65 --- --- ---	59 --- --- ---	Red pine, eastern white pine, white spruce.
Au--------------- Auburndale	2W	Slight	Severe	Moderate	Moderate	Red maple----------- American basswood--- American elm-------- Balsam fir---------- Black ash-----------	55 --- --- 54 45	35 --- --- 105 30	White spruce, black spruce, cottonwood.
Ba, Bb----------- Barronett	2W	Slight	Severe	Severe	Severe	Tamarack------------ Black ash----------- Quaking aspen-------	40 --- ---	27 --- ---	White spruce, black spruce.
Be--------------- Beseman	2W	Slight	Severe	Severe	Slight	Black spruce-------- Tamarack------------	23 34	32 22	Black spruce.
BlA, BlB, BlC2-- Billett	4A	Slight	Slight	Slight	Slight	Northern red oak---- Black oak----------- White oak----------- Shagbark hickory---- Northern pin oak----	60 --- --- --- ---	51 --- --- --- ---	Red pine, eastern white pine, white spruce, Norway spruce.
BmA-------------- Billett	4A	Slight	Slight	Slight	Slight	Northern red oak---- White oak----------- Black oak----------- Northern pin oak---- Shagbark hickory----	60 --- --- --- ---	51 --- --- --- ---	Red pine, eastern white pine, white spruce, Norway spruce.
BoE-------------- Boone	2R	Moderate	Severe	Severe	Slight	Black oak----------- Northern red oak---- Jack pine-----------	44 --- 49	29 --- 65	Red pine, jack pine.
BpA-------------- Brill	3A	Slight	Slight	Slight	Slight	Sugar maple--------- Yellow birch-------- American basswood--- White ash----------- Northern red oak---- Eastern white pine-- Bigtooth aspen------	62 71 69 74 --- --- ---	39 44 64 72 --- --- ---	White spruce, eastern white pine, red pine.

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Volume*	
BuA Burkhardt	2A	Slight	Slight	Slight	Slight	Northern pin oak Black oak Jack pine	52 --- ---	36 --- ---	Eastern white pine, red pine, jack pine, Norway spruce.
Cb Cable	2W	Slight	Severe	Severe	Severe	Red maple Black ash White ash Balsam fir Black spruce Quaking aspen White spruce	56 48 --- --- --- --- ---	36 31 --- --- --- --- ---	White spruce, red maple, balsam fir, black spruce.
CdB, CdC2 Campia	3A	Slight	Slight	Slight	Slight	Sugar maple Northern red oak White ash American basswood	62 65 --- 71	39 59 --- 67	Eastern white pine, red pine, white spruce.
CdD2 Campia	3R	Moderate	Moderate	Slight	Slight	Sugar maple Northern red oak White ash American basswood	62 65 --- 71	39 59 --- 67	Eastern white pine, red pine, white spruce.
CeA Caryville	3A	Slight	Slight	Slight	Slight	Northern red oak White oak Red maple	55 --- ---	42 --- ---	Eastern white pine, white ash, silver maple.
CkA, CkB, CkC2 Chetek	6S	Slight	Slight	Moderate	Slight	Jack pine Northern pin oak Black oak Eastern white pine	57 53 --- ---	80 36 --- ---	Red pine, jack pine, eastern white pine.
CkD2**, CkE**: Chetek	6R	Moderate	Moderate	Moderate	Slight	Jack pine Northern pin oak Black oak Eastern white pine	57 53 --- ---	80 36 --- ---	Red pine, jack pine, eastern white pine.
Mahtomedi	6R	Moderate	Moderate	Moderate	Slight	Red pine White spruce Jack pine Eastern white pine	55 55 60 50	88 107 85 90	Red pine, jack pine, eastern white pine, white spruce.
Cm Comstock	3W	Slight	Moderate	Slight	Moderate	Sugar maple Red maple Balsam fir Quaking aspen White ash Paper birch	61 65 --- --- --- ---	38 40 --- --- --- ---	Eastern white pine, white spruce, red pine.
CuA Crystal Lake	3A	Slight	Slight	Slight	Slight	Sugar maple American basswood Yellow birch Quaking aspen Bigtooth aspen American elm White ash	61 69 --- --- --- --- 71	38 64 --- --- --- --- 67	Eastern white pine, red pine, white spruce.

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Volume*	
ElB, ElC2 Eleva	2A	Slight	Slight	Slight	Slight	Black oak Jack pine Northern pin oak Northern red oak	45 --- --- ---	30 --- --- ---	Jack pine, red pine.
ElD2 Eleva	2R	Moderate	Moderate	Slight	Slight	Black oak Jack pine Northern pin oak Northern red oak	45 --- --- ---	30 --- --- ---	Jack pine, red pine.
EmB, EmC2 Elkmound	2D	Slight	Slight	Moderate	Moderate	Northern red oak Black oak White oak Northern pin oak Quaking aspen	46 --- --- --- ---	29 --- --- --- ---	Red pine, jack pine, eastern redcedar.
EmD2 Elkmound	2R	Severe	Moderate	Severe	Moderate	Northern red oak Black oak White oak Northern pin oak Quaking aspen	46 --- --- --- ---	29 --- --- --- ---	Red pine, jack pine, eastern redcedar.
EmE Elkmound	2R	Severe	Severe	Severe	Moderate	Northern red oak Black oak White oak Northern pin oak Quaking aspen	46 --- --- --- ---	29 --- --- --- ---	Red pine, jack pine, eastern redcedar.
Eo Elm Lake	3W	Slight	Severe	Severe	Moderate	Red maple White ash Bur oak	60 --- ---	38 --- ---	White spruce, red maple, white ash.
FaB Fallcreek	4W	Slight	Moderate	Slight	Moderate	Northern red oak Sugar maple White ash American basswood Red maple	68 --- --- --- ---	63 --- --- --- ---	Red pine, white spruce, eastern white pine.
FbB, FbC2 Flambeau	4A	Slight	Slight	Slight	Slight	Northern red oak Northern pin oak White oak White ash American basswood Bur oak	65 --- --- --- --- ---	59 --- --- --- --- ---	Red pine, eastern white pine, white spruce, jack pine.
Fm Fordum	2W	Slight	Severe	Severe	Severe	Silver maple Red maple White ash Northern white-cedar Tamarack Black spruce Balsam fir White spruce	80 --- --- --- --- --- --- ---	34 --- --- --- --- --- --- ---	Silver maple, red maple, white ash.
FnB, FnC2 Freeon	4A	Slight	Slight	Slight	Slight	Northern red oak American basswood Red maple White oak Sugar maple Quaking aspen Bigtooth aspen White ash	63 --- --- --- 62 --- --- ---	56 --- --- --- 39 --- --- ---	Red pine, eastern white pine, white spruce.

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Volume*	
FrA Friendship	6S	Slight	Slight	Moderate	Slight	Jack pine	56	78	Red pine, eastern white pine, jack pine.
						Red pine	52	80	
						Eastern white pine	---	---	
						Northern pin oak	---	---	
GaB, GaC2 Gale	5A	Slight	Slight	Slight	Slight	Northern red oak	74	72	Red pine, eastern white pine, white spruce.
						Sugar maple	---	---	
						White oak	---	---	
GaD2 Gale	5R	Moderate	Moderate	Slight	Slight	Northern red oak	74	72	Red pine, eastern white pine, white spruce.
						Sugar maple	---	---	
						White oak	---	---	
Gr Greenwood	3W	Slight	Severe	Severe	Severe	Tamarack	53	47	
						Black spruce	15	23	
						Balsam fir	39	69	
						Red maple	---	---	
Ha Halder	4W	Slight	Moderate	Slight	Moderate	White ash	65	59	White ash, silver maple, white spruce.
						Red maple	---	---	
						Northern red oak	---	---	
HeB Hiles	4A	Slight	Slight	Slight	Slight	Northern red oak	65	59	Red pine, eastern white pine, white spruce.
						Black oak	---	---	
						White oak	---	---	
HfB Hiles Variant	4C	Slight	Slight	Moderate	Moderate	Northern red oak	65	59	Red pine, eastern white pine, white spruce.
						American basswood	---	---	
						White ash	---	---	
						Sugar maple	---	---	
HnB, HnC2 Hixton	4A	Slight	Slight	Slight	Slight	Northern red oak	65	59	Northern white-cedar, red pine, white spruce.
						White oak	---	---	
						Black oak	---	---	
						Quaking aspen	78	91	
HuB, HuC2 Humbird	4A	Slight	Slight	Slight	Slight	Northern red oak	65	59	Red pine, eastern white pine, white spruce, red maple.
						Northern pin oak	55	38	
						Red maple	---	---	
						Quaking aspen	---	---	
						Jack pine	63	91	
KeB Kert	4W	Slight	Moderate	Slight	Moderate	Northern red oak	65	59	White spruce, eastern white pine, red pine.
						Sugar maple	---	---	
						Swamp white oak	---	---	
						Red maple	---	---	
La Lows	2W	Slight	Severe	Moderate	Moderate	Silver maple	80	34	Silver maple, red maple, green ash, white ash, white spruce.
						White ash	---	---	
						Green ash	---	---	
						Red maple	---	---	
LoB, LoC2 Loyal	3A	Slight	Slight	Slight	Slight	Sugar maple	60	38	Red pine, eastern white pine, white spruce.
						Northern red oak	---	---	
						American basswood	---	---	
						White ash	---	---	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Volume*	
Lp---------- Lupton	3W	Slight	Severe	Severe	Severe	Northern white-cedar	33	48	
						Black spruce--------	20	29	
						Balsam fir----------	46	86	
						Black ash-----------	---	---	
						Paper birch---------	---	---	
						Tamarack------------	---	---	
						Red maple-----------	---	---	
						Quaking aspen-------	---	---	
						White spruce--------	---	---	
MbB------------ Magnor	3W	Slight	Moderate	Slight	Moderate	Sugar maple---------	61	38	Eastern white pine, white spruce, red pine.
						Northern red oak----	67	61	
						Red maple-----------	65	40	
						American basswood---	67	61	
						Yellow birch--------	---	---	
						White ash-----------	68	63	
						Quaking aspen-------	---	---	
						Bigtooth aspen------	---	---	
McB------------- Magnor	3X	Slight	Moderate	Slight	Moderate	Sugar maple---------	61	38	Eastern white pine, white spruce, red pine.
						Northern red oak----	67	61	
						Red maple-----------	65	40	
						American basswood---	67	61	
						Yellow birch--------	65	40	
						White ash-----------	68	63	
						Quaking aspen-------	---	---	
						Bigtooth aspen------	---	---	
MdB, MdC-------- Mahtomedi	6S	Slight	Moderate	Moderate	Slight	Red pine------------	55	88	Red pine, jack pine, eastern white pine, white spruce.
						White spruce--------	55	107	
						Jack pine-----------	60	85	
						Eastern white pine--	50	90	
Me-------------- Markey	4W	Slight	Severe	Severe	Severe	Northern white-cedar	41	61	
						Quaking aspen-------	45	32	
						Balsam fir----------	---	---	
						Black spruce--------	---	---	
						Tamarack------------	---	---	
						Black ash-----------	---	---	
						Paper birch---------	---	---	
						Red maple-----------	---	---	
						White spruce--------	---	---	
Mh-------------- Meehan	5W	Slight	Moderate	Moderate	Moderate	Jack pine-----------	55	77	Eastern white pine, jack pine, white spruce, balsam fir, red pine, red maple.
						Northern pin oak----	60	43	
						Red pine------------	50	75	
						Paper birch---------	---	---	
						Eastern white pine--	50	90	
						Quaking aspen-------	---	---	
						Balsam fir----------	---	---	
						White spruce--------	---	---	
						Black spruce--------	---	---	
MkB, MkC-------- Menahga	6S	Slight	Moderate	Moderate	Slight	Jack pine-----------	59	84	Red pine, white spruce, eastern white pine, jack pine.
						Red pine------------	60	101	
						Eastern white pine--	55	106	
						Quaking aspen-------	65	73	
						Paper birch---------	60	65	
MlA, MlB, MmA--- Meridian	4A	Slight	Slight	Slight	Slight	Northern red oak----	68	63	Red pine, eastern white pine, white spruce.
						Sugar maple---------	---	---	
						American basswood---	---	---	
						White ash-----------	---	---	
						White oak-----------	---	---	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index	Volume*	Trees to plant
MrB------------- Merrillan	4W	Slight	Moderate	Slight	Moderate	Northern red oak----	60	51	Red pine, eastern white pine, white spruce, red maple.
						Northern pin oak----	---	---	
						Red maple-----------	---	---	
						Quaking aspen-------	---	---	
Mu-------------- Minocqua	7W	Slight	Severe	Severe	Severe	Balsam fir----------	54	105	Red maple, white ash, white spruce, black spruce.
						Red maple-----------	55	35	
						White ash-----------	---	---	
						Black ash-----------	---	---	
						Tamarack------------	55	50	
						Northern white-cedar	---	---	
						Quaking aspen-------	---	---	
MvA------------- Moundville	6S	Slight	Slight	Moderate	Slight	Red pine------------	53	82	Red pine, jack pine.
						Jack pine-----------	---	---	
						Northern pin oak----	---	---	
Na-------------- Newson	6W	Slight	Severe	Severe	Slight	Jack pine-----------	59	84	Eastern white pine, white spruce.
						Quaking aspen-------	50	43	
						Paper birch---------	---	---	
						Eastern white pine--	---	---	
NtB, NtC2------- Northfield	3D	Slight	Slight	Moderate	Moderate	Northern red oak----	53	39	Red pine, jack pine, eastern redcedar.
						Northern pin oak----	---	---	
						Black oak-----------	---	---	
						White oak-----------	---	---	
						Red maple-----------	---	---	
						Quaking aspen-------	---	---	
						Paper birch---------	---	---	
NtD2------------ Northfield	3R	Moderate	Moderate	Moderate	Moderate	Northern red oak----	53	39	Red pine, jack pine, eastern redcedar.
						Northern pin oak----	---	---	
						Black oak-----------	---	---	
						White oak-----------	---	---	
						Red maple-----------	---	---	
						Quaking aspen-------	---	---	
						Paper birch---------	---	---	
Oe-------------- Oesterle	3W	Slight	Moderate	Slight	Moderate	Red maple-----------	66	41	Red maple, white ash, white spruce.
						Northern red oak----	72	69	
						Quaking aspen-------	78	91	
						Balsam fir----------	---	---	
						Paper birch---------	---	---	
						Yellow birch--------	---	---	
Or-------------- Orion	2W	Slight	Moderate	Slight	Slight	Silver maple--------	80	34	White spruce, silver maple, white ash, eastern cottonwood.
						Red maple-----------	---	---	
						White ash-----------	---	---	
OsC2------------ Otterholt	5A	Slight	Slight	Slight	Slight	Northern red oak----	72	69	Eastern white pine, red pine, white spruce.
						Sugar maple---------	---	---	
						American basswood---	---	---	
PdB, PdC-------- Plainbo	5S	Slight	Moderate	Moderate	Slight	Jack pine-----------	55	77	Jack pine, eastern white pine.
						Northern pin oak----	47	32	
						Black oak-----------	---	---	
PdD------------- Plainbo	5R	Moderate	Moderate	Moderate	Slight	Jack pine-----------	55	77	Jack pine, eastern white pine.
						Northern pin oak----	47	32	
						Black oak-----------	---	---	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Volume*	
Pv----------------- Plover	3W	Slight	Moderate	Slight	Moderate	Red maple-----------	65	40	Eastern white pine, white spruce, black spruce.
						American basswood---	---	---	
						American elm--------	---	---	
						Yellow birch--------	---	---	
Px----------------- Poskin	3W	Slight	Moderate	Slight	Moderate	Red maple-----------	65	40	White spruce, red maple, white ash, black spruce.
						White ash-----------	---	---	
						Eastern hemlock-----	---	---	
Rb, Rc------------- Rib	2W	Slight	Severe	Severe	Severe	Red maple-----------	55	35	Red maple, white spruce.
						Black ash-----------	---	---	
RfA---------------- Richford	4S	Slight	Slight	Moderate	Slight	Northern red oak----	61	53	Eastern white pine, red pine, jack pine, eastern redcedar.
						Red pine------------	49	73	
						Eastern white pine--	61	124	
RoA, RoB, RoC2, RpA, RpB, RpC2- Rosholt	3A	Slight	Slight	Slight	Slight	Sugar maple---------	65	40	Red pine, eastern white pine.
						White ash-----------	77	76	
						American basswood---	---	---	
						Northern red oak----	69	64	
SaB, SaC2---------- Santiago	4A	Slight	Slight	Slight	Slight	Northern red oak----	64	57	Red pine, eastern white pine, white spruce.
						Sugar maple---------	61	38	
						American basswood---	---	---	
						White ash-----------	---	---	
						Red maple-----------	---	---	
						Red pine------------	---	---	
						Quaking aspen-------	---	---	
SaD2--------------- Santiago	4R	Moderate	Moderate	Slight	Slight	Northern red oak----	64	57	Red pine, eastern white pine, white spruce.
						Sugar maple---------	61	38	
						American basswood---	---	---	
						White ash-----------	---	---	
						Red maple-----------	---	---	
						Red pine------------	---	---	
						Quaking aspen-------	---	---	
SbA---------------- Sattre	4A	Slight	Slight	Slight	Slight	Northern red oak----	65	59	Eastern white pine, red pine, black walnut, sugar maple.
						White oak-----------	65	59	
ScB, SdA----------- Scott Lake	4A	Slight	Slight	Slight	Slight	Northern red oak----	65	59	Eastern white pine, red pine, white spruce, black spruce.
						Sugar maple---------	61	38	
						Yellow birch--------	---	---	
						American basswood---	---	---	
						Red maple-----------	---	---	
						Quaking aspen-------	---	---	
						Bigtooth aspen------	---	---	
						White ash-----------	---	---	
SeB, SeC2---------- Seaton	5A	Slight	Slight	Slight	Slight	Northern red oak----	70	66	Red pine, white spruce, northern white-cedar.
						Sugar maple---------	---	---	
						American basswood---	---	---	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Volume*	
SeD2 Seaton	5R	Moderate	Moderate	Slight	Slight	Northern red oak Sugar maple American basswood	70 --- ---	66 --- ---	Red pine, white spruce, northern white-cedar.
SfA, SgA, SgB Seaton	5A	Slight	Slight	Slight	Slight	Northern red oak Red maple Black cherry White oak American basswood White ash	70 --- --- --- --- ---	66 --- --- --- --- ---	Red pine, white spruce, eastern white pine.
Sm Seelyeville	8W	Slight	Severe	Severe	Severe	Balsam fir Tamarack Northern white-cedar	57 --- 33	111 --- 48	
So Shiffer	2A	Slight	Slight	Slight	Slight	Silver maple Green ash Red maple Northern red oak	80 --- --- ---	34 --- --- ---	Silver maple, red maple, white ash, green ash, white spruce.
SrB, SrC2 Spencer	3A	Slight	Slight	Slight	Slight	Sugar maple Northern red oak American basswood	63 70 67	39 66 61	Eastern white pine, red pine, white spruce.
[illegible]B [illegible]	3A	Slight	Slight	Slight	Slight	Sugar maple Northern red oak American basswood	63 70 ---	39 66 ---	Eastern white pine, red pine, white spruce.
TeB Tell	4A	Slight	Slight	Slight	Slight	Northern red oak Sugar maple White oak	65 --- ---	59 --- ---	Red pine, eastern white pine, white spruce.
Ve Vesper	1W	Slight	Severe	Severe	Severe	White ash Red maple Quaking aspen	39 --- ---	24 --- ---	
Wb Warman Variant	2W	Slight	Moderate	Slight	Slight	Red maple White ash	45 ---	30 ---	White spruce, eastern white pine, red maple, white ash.
WeB Withee	4W	Slight	Moderate	Slight	Moderate	Northern red oak Sugar maple American basswood Yellow birch White ash Red maple	69 64 --- --- 69 ---	64 40 --- --- 64 ---	White spruce, eastern white pine, white spruce, red pine, white ash, red maple.

* Volume is the yield in cubic feet per acre per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS

(The symbol < means less than; > means more than. Absence of an entry indicates that trees generally do not grow to the given height on that soil)

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
AfB---------------- Alban	---	Northern white-cedar, lilac, American cranberrybush, Amur maple, gray dogwood.	White spruce, Norway spruce, Black Hills spruce.	Eastern white pine, red maple, red pine, white ash.	---
AfC---------------- Alban	---	Lilac, Amur maple, American cranberrybush, northern white-cedar, gray dogwood.	White spruce, Norway spruce, Black Hills spruce.	Eastern white pine, red pine, white ash, red maple.	---
AgB---------------- Almena	---	Nannyberry viburnum, redosier dogwood, silky dogwood, American cranberrybush, lilac, northern white-cedar.	White spruce------	Silver maple, eastern white pine, red pine, white ash, red maple.	---
AlB---------------- Amery	Manyflower cotoneaster.	Eastern redcedar, Siberian peashrub, silky dogwood, lilac, American cranberrybush, Amur maple, gray dogwood.	Norway spruce-----	Eastern white pine, red pine, jack pine.	---
AlC, AlD, AlF----- Amery	---	Lilac, American cranberrybush, Amur maple, northern white-cedar, gray dogwood.	White spruce, Norway spruce, Black Hills spruce.	Eastern white pine, red pine, white ash, red maple.	---
AnB, AnC2----------- Antigo	Manyflower cotoneaster.	Gray dogwood, American cranberrybush, Amur maple, lilac, eastern redcedar, Siberian peashrub, silky dogwood.	Norway spruce-----	Jack pine, red pine, eastern white pine.	---
AoA---------------- Arenzville	---	Northern white-cedar, lilac, American cranberrybush, nannyberry viburnum, silky dogwood, redosier dogwood.	White spruce------	Eastern white pine, red pine, white ash, red maple.	Silver maple.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
ApB, ApC2, ApD2, AsB, AsC2, AsD2: Arland	Manyflower cotoneaster.	Eastern redcedar, Amur maple, American cranberrybush, lilac, Siberian peashrub, silky dogwood, gray dogwood.	Norway spruce	Eastern white pine, red pine, jack pine.	---
Au. Auburndale					
Ba: Barronett	---	Northern white-cedar, American cranberrybush, nannyberry viburnum, silky dogwood, redosier dogwood, common ninebark.	White spruce, balsam fir.	Silver maple, red maple, green ash, white ash.	---
Bb. Barronett					
Be. Beseman					
BlA, BlB, BlC2, BmA: Billett	Manyflower cotoneaster.	Gray dogwood, silky dogwood, Siberian peashrub, American cranberrybush, Amur maple, lilac, eastern redcedar.	Norway spruce	Jack pine, red pine, eastern white pine.	---
BoE: Boone	Manyflower cotoneaster.	Siberian peashrub, eastern redcedar, lilac, silky dogwood, gray dogwood, Amur maple, American cranberrybush.	Norway spruce	Eastern white pine, red pine, jack pine.	---
BpA: Brill	Manyflower cotoneaster.	Silky dogwood, eastern redcedar, Amur maple, lilac, gray dogwood, Siberian peashrub, American cranberrybush.	Norway spruce	Eastern white pine, red pine, jack pine.	---

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
BuA----------------- Burkhardt	Manyflower cotoneaster.	Eastern redcedar, lilac, Amur maple, American cranberrybush, Siberian peashrub, silky dogwood, gray dogwood.	Norway spruce-----	Eastern white pine, red pine, jack pine.	---
Cb. Cable					
CdB, CdC2, CdD2--- Campia	---	Gray dogwood, lilac, Amur maple, northern white-cedar, redosier dogwood.	Norway spruce, white spruce, Black Hills spruce.	White ash, red maple, red pine, eastern white pine.	---
CeA---------------- Caryville	---	Northern white-cedar, lilac, American cranberrybush, nannyberry viburnum, silky dogwood, gray dogwood.	White spruce------	Eastern white pine, red pine, white ash, red maple, silver maple.	---
CkA, CkB, CkC2---- Chetek	Manyflower cotoneaster.	Eastern redcedar, lilac, Amur maple, American cranberrybush, Siberian peashrub, gray dogwood, silky dogwood.	Norway spruce-----	Eastern white pine, red pine, jack pine.	---
CkD2*, CkE*: Chetek-----------	Manyflower cotoneaster.	Eastern redcedar, lilac, Amur maple, American cranberrybush, Siberian peashrub, gray dogwood, silky dogwood.	Norway spruce-----	Eastern white pine, red pine, jack pine.	---
Mahtomedi---------	Manyflower cotoneaster.	Gray dogwood, silky dogwood, Siberian peashrub, American cranberrybush, Amur maple, lilac, eastern redcedar.	Norway spruce-----	Jack pine, red pine, eastern white pine.	---

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
Cm Comstock	---	Nannyberry viburnum, northern white-cedar, lilac, American cranberrybush, silky dogwood, redosier dogwood.	White spruce	Eastern white pine, red pine, white ash, red maple, silver maple.	---
CuA Crystal Lake	---	Gray dogwood, Amur maple, American cranberrybush, lilac, northern white-cedar.	Black Hills spruce, Norway spruce, white spruce.	Eastern white pine, red pine, white ash, red maple.	---
ElB, ElC2, ElD2 Eleva	Manyflower cotoneaster.	Siberian peashrub, eastern redcedar, lilac, American cranberrybush, Amur maple, gray dogwood, silky dogwood.	Norway spruce	Eastern white pine, red pine, jack pine.	---
EmB, EmC2, EmD2, EmE. Elkmound					
Eo. Elm Lake					
FaB Fallcreek	---	Northern white-cedar, lilac, American cranberrybush, nannyberry viburnum, silky dogwood, redosier dogwood.	White spruce	Eastern white pine, red pine, white ash, red maple, silver maple.	---
FbB, FbC2 Flambeau	Manyflower cotoneaster.	Eastern redcedar, Siberian peashrub, silky dogwood, lilac, American cranberrybush, Amur maple, gray dogwood.	Norway spruce	Eastern white pine, red pine, jack pine.	---
Fm. Fordum					
FnB, FnC2 Freeon	---	Amur maple, lilac, American cranberrybush, northern white-cedar, gray dogwood.	White spruce, Norway spruce, Black Hills spruce.	Eastern white pine, red pine, white ash, red maple.	---

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
FrA----------------- Friendship	Manyflower cotoneaster.	Eastern redcedar, lilac, Amur maple, American cranberrybush, Siberian peashrub, silky dogwood, gray dogwood.	Norway spruce-----	Eastern white pine, red pine, jack pine.	---
GaB, GaC2, GaD2----- Gale	Manyflower cotoneaster.	Siberian peashrub, silky dogwood, eastern redcedar, American cranberrybush, Amur maple, lilac, gray dogwood.	Norway spruce-----	Eastern white pine, red pine, jack pine.	---
Gr. Greenwood					
Ha----------------- Halder	---	Redosier dogwood, silky dogwood, nannyberry viburnum, American cranberrybush, lilac, northern white-cedar.	White spruce------	Silver maple, eastern white pine, red pine, white ash, red maple.	---
HeB---------------- Hiles	Manyflower cotoneaster.	Eastern redcedar, lilac, American cranberrybush, Amur maple, silky dogwood, gray dogwood.	Siberian peashrub, Norway spruce.	Eastern white pine, red pine, jack pine.	---
HfB---------------- Hiles Variant	---	Alternateleaf dogwood, northern white-cedar, lilac, American cranberrybush, Amur maple, silky dogwood, gray dogwood.	White spruce------	Eastern white pine, red pine, white ash, red maple.	---
HnB, HnC2---------- Hixton	Manyflower cotoneaster.	Gray dogwood, silky dogwood, Siberian peashrub, American cranberrybush, Amur maple, lilac, eastern redcedar.	Norway spruce-----	Eastern white pine, red pine, jack pine.	---

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
HuB, HuC2 Humbird	Manyflower cotoneaster.	Eastern redcedar, Siberian peashrub, lilac, American cranberrybush, Amur maple, silky dogwood, gray dogwood.	Norway spruce	Eastern white pine, red pine, jack pine.	---
KeB Kert	---	Northern white-cedar, lilac, American cranberrybush, nannyberry viburnum, silky dogwood, redosier dogwood.	White spruce	Eastern white pine, red pine, white ash, red maple, silver maple.	---
La Lows	---	Northern white-cedar, American cranberrybush, nannyberry viburnum, silky dogwood, redosier dogwood, common ninebark.	White spruce, balsam fir.	Silver maple, white ash, green ash, red maple.	---
LoB, LoC2 Loyal	---	Northern white-cedar, lilac, American cranberrybush, Amur maple, gray dogwood.	White spruce, Norway spruce, Black Hills spruce.	Eastern white pine, red pine, white ash, red maple.	---
Lp. Lupton					
MbB Magnor	---	Northern white-cedar, lilac, American cranberrybush, nannyberry viburnum, silky dogwood, redosier dogwood.	White spruce	Eastern white pine, red pine, white ash, red maple, silver maple.	---
McB. Magnor					
MdB, MdC Mahtomedi	Manyflower cotoneaster.	Gray dogwood, silky dogwood, Siberian peashrub, American cranberrybush, Amur maple, lilac, eastern redcedar.	Norway spruce	Jack pine, red pine, eastern white pine.	---
Me. Markey					

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
Mh Meehan	---	Redosier dogwood, silky dogwood, nannyberry viburnum, American cranberrybush, lilac, northern white-cedar.	White spruce	Red maple, white ash, silver maple, red pine, eastern white pine.	---
MkB, MkC Menahga	Manyflower cotoneaster.	Gray dogwood, silky dogwood, Siberian peashrub, American cranberrybush, Amur maple, lilac, eastern redcedar.	Norway spruce	Jack pine, red pine, eastern white pine.	---
MlA, MlB Meridian	Manyflower cotoneaster.	Gray dogwood, silky dogwood, Siberian peashrub, American cranberrybush, Amur maple, lilac, eastern redcedar.	Norway spruce	Jack pine, red pine, eastern white pine.	---
MmA Meridian	Manyflower cotoneaster.	Gray dogwood, Amur maple, American cranberrybush, lilac, eastern redcedar, Siberian peashrub, silky dogwood.	Norway spruce	Eastern white pine, red pine, jack pine.	---
MrB Merrillan	---	Nannyberry viburnum, northern white-cedar, lilac, American cranberrybush, silky dogwood, redosier dogwood.	White spruce	Eastern white pine, red pine, white ash, red maple, silver maple.	---
Mu. Minocqua					
MvA Moundville	---	Redosier dogwood, nannyberry viburnum, silky dogwood, American cranberrybush, lilac, northern white-cedar.	White spruce	Silver maple, red maple, white ash, red pine, eastern white pine.	---
Na. Newson					

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
NtB, NtC2, NtD2. Northfield					
Oe Oesterle	---	Nannyberry viburnum, American cranberrybush, redosier dogwood, lilac, northern white-cedar, silky dogwood.	White spruce	Red maple, silver maple, white ash, red pine, eastern white pine.	---
Or Orion	---	Common ninebark, nannyberry viburnum, northern white-cedar, lilac, American cranberrybush, silky dogwood, redosier dogwood.	White spruce	Eastern white pine, white ash, red maple, silver maple.	---
OsC2 Otterholt	---	Gray dogwood, Amur maple, American cranberrybush, lilac, northern white-cedar.	Black Hills spruce, white spruce, Norway spruce.	Eastern white pine, red pine, white ash, red maple.	---
Pc*. Pits					
PdB, PdC, PdD Plainbo	Manyflower cotoneaster.	Eastern redcedar, lilac, Amur maple, American cranberrybush, Siberian peashrub, silky dogwood, gray dogwood.	Norway spruce	Eastern white pine, red pine, jack pine.	---
Pv Plover	---	Northern white-cedar, nannyberry viburnum, silky dogwood, American cranberrybush, redosier dogwood, lilac.	White spruce	Eastern white pine, red maple, white ash, red pine, silver maple.	---
Px Poskin	---	Common ninebark, northern white-cedar, lilac, American cranberrybush, silky dogwood, redosier dogwood, nannyberry viburnum.	White spruce	Eastern white pine, white ash, red maple, silver maple.	---

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
Rb------------------- Rib	---	Northern white-cedar, redosier dogwood, American cranberrybush, silky dogwood, common ninebark, nannyberry viburnum.	White spruce, balsam fir.	Red maple, white ash, green ash.	Silver maple.
Rc. Rib					
RfA----------------- Richford	Manyflower cotoneaster.	Eastern redcedar, lilac, Amur maple, American cranberrybush, Siberian peashrub, silky dogwood, gray dogwood.	Norway spruce-----	Eastern white pine, red pine, jack pine.	---
RoA, RoB, RoC2, RpA, RpB, RpC2--- Rosholt	Manyflower cotoneaster.	Lilac, American cranberrybush, Amur maple, eastern redcedar, Siberian peashrub, gray dogwood, silky dogwood.	Norway spruce-----	Red pine, jack pine, eastern white pine.	---
SaB, SaC2, SaD2--- Santiago	---	Gray dogwood, northern white-cedar, Amur maple, American cranberrybush, lilac.	Black Hills spruce, white spruce, Norway spruce.	Eastern white pine, red pine, white spruce, red maple.	---
SbA---------------- Sattre	Lilac, Siberian peashrub.	Hackberry, eastern redcedar, Manchurian crabapple.	Eastern white pine, Russian-olive, green ash, jack pine, honeylocust.	---	---
ScB, SdA----------- Scott Lake	Manyflower cotoneaster.	American cranberrybush, eastern redcedar, Siberian peashrub, lilac, gray dogwood, American cranberrybush, Amur maple.	Norway spruce-----	Eastern white pine, red pine, jack pine.	---
SeB, SeC2, SeD2--- Seaton	---	Gray dogwood, redosier dogwood, lilac, Siberian peashrub.	Hackberry, northern white-cedar, Russian-olive, eastern redcedar, Amur maple.	Eastern white pine, green ash.	---

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
SfA---------------- Seaton	---	Gray dogwood, lilac, redosier dogwood, Siberian peashrub.	Northern white-cedar, Russian-olive, hackberry, eastern redcedar, Amur maple.	Eastern white pine, green ash.	---
SgA, SgB---------- Seaton	---	Gray dogwood, northern white-cedar, lilac, redosier dogwood, Siberian peashrub.	Russian-olive, hackberry, eastern redcedar, Amur maple.	Eastern white pine, green ash, red pine.	---
Sm. Seelyeville					
So----------------- Shiffer	---	Northern white-cedar, lilac, American cranberrybush, nannyberry viburnum, silky dogwood, gray dogwood.	White spruce------	Eastern white pine, red pine, white ash, red maple, silver maple.	---
SrB, SrC2--------- Spencer	---	Gray dogwood, Amur maple, American cranberrybush, lilac, northern white-cedar.	Norway spruce, Black Hills spruce, white spruce.	Eastern white pine, red pine, red maple, white ash.	---
SsA, SsB---------- Spencer	---	Northern white-cedar, lilac, American cranberrybush, Amur maple, gray dogwood.	White spruce, Black Hills spruce, Norway spruce.	Eastern white pine, red pine, white ash, red maple.	---
TeB--------------- Tell	Manyflower cotoneaster.	Siberian peashrub, eastern redcedar, lilac, American cranberrybush, Amur maple, silky dogwood, gray dogwood.	Norway spruce-----	Eastern white pine, red pine, jack pine.	---
Ud. Udifluvents					
Ve. Vesper					
Wb---------------- Warman Variant	---	Northern white-cedar, lilac, silver maple, American cranberrybush, nannyberry viburnum, silky dogwood, redosier dogwood.	White spruce------	Eastern white pine, red pine, red maple, white ash.	---

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
WeB------------ Withee	---	Northern white-cedar, lilac, American cranberrybush, nannyberry viburnum, silky dogwood, redosier dogwood.	White spruce, silver maple.	Eastern white pine, red pine, white ash, red maple.	---

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--RECREATIONAL DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
AfB------------------ Alban	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
AfC------------------ Alban	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
AgB------------------ Almena	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
AlB------------------ Amery	Slight----------	Slight----------	Moderate: slope, small stones.	Slight----------	Moderate: droughty.
AlC------------------ Amery	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: droughty, slope.
AlD------------------ Amery	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
AlF------------------ Amery	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
AnB------------------ Antigo	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
AnC2----------------- Antigo	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
AoA------------------ Arenzville	Severe: flooding.	Slight----------	Moderate: flooding.	Slight----------	Moderate: flooding.
ApB------------------ Arland	Slight----------	Slight----------	Moderate: slope, depth to rock, small stones.	Slight----------	Moderate: depth to rock.
ApC2----------------- Arland	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope, depth to rock.
ApD2----------------- Arland	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
AsB------------------ Arland	Slight----------	Slight----------	Moderate: slope, depth to rock, small stones.	Slight----------	Moderate: depth to rock.
AsC2----------------- Arland	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope, depth to rock.
AsD2----------------- Arland	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Au------------------- Auburndale	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Ba, Bb Barronett	Severe: ponding, flooding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Be Beseman	Severe: flooding, ponding, excess humus.	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.
BlA Billett	Slight	Slight	Slight	Slight	Moderate: droughty.
BlB Billett	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty.
BlC2 Billett	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: droughty, slope.
BmA Billett	Slight	Slight	Slight	Slight	Moderate: droughty.
BoE Boone	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: too sandy, slope.	Severe: droughty, slope.
BpA Brill	Slight	Slight	Slight	Slight	Slight.
BuA Burkhardt	Slight	Slight	Slight	Slight	Moderate: droughty.
Cb Cable	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
CdB Campia	Slight	Slight	Moderate: slope.	Slight	Slight.
CdC2 Campia	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
CdD2 Campia	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
CeA Caryville	Severe: flooding.	Slight	Slight	Slight	Moderate: droughty.
CkA Chetek	Slight	Slight	Moderate: small stones.	Slight	Moderate: large stones, droughty.
CkB Chetek	Slight	Slight	Moderate: slope, small stones.	Slight	Moderate: large stones, droughty.
CkC2 Chetek	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: large stones, droughty, slope.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
CkD2*:					
Chetek	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Mahtomedi	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: too sandy, slope.	Severe: slope.
CkE*:					
Chetek	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Mahtomedi	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Cm Comstock	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
CuA Crystal Lake	Slight	Slight	Slight	Slight	Slight.
ElB Eleva	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Moderate: small stones, droughty.
ElC2 Eleva	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight	Moderate: small stones, droughty, slope.
ElD2 Eleva	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
EmB Elkmound	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock, small stones.	Slight	Severe: depth to rock.
EmC2 Elkmound	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock, small stones.	Slight	Severe: depth to rock.
EmD2 Elkmound	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock, small stones.	Moderate: slope.	Severe: slope, depth to rock.
EmE Elkmound	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock, small stones.	Severe: slope.	Severe: slope, depth to rock.
Eo Elm Lake	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding.
FaB Fallcreek	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: large stones, wetness.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
FbB Flambeau	Slight	Slight	Moderate: slope.	Slight	Moderate: large stones.
FbC2 Flambeau	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: large stones, slope.
Fm Fordum	Severe: flooding, ponding.	Severe: ponding.	Severe	Severe: ponding.	Severe.
FnB Freeon	Moderate: wetness.	Moderate: wetness.	Moderate: slope, wetness.	Slight	Slight.
FnC2 Freeon	Moderate: slope, wetness.	Moderate: slope, wetness.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
FrA Friendship	Moderate: too sandy.	Moderate: too sandy.	Moderate: small stones, too sandy.	Moderate: too sandy.	Moderate: droughty.
GaB Gale	Slight	Slight	Moderate: slope, depth to rock.	Slight	Moderate: depth to rock.
GaC2 Gale	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope, depth to rock.
GaD2 Gale	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Gr Greenwood	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
Ha Halder	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
HeB Hiles	Moderate: wetness.	Moderate: wetness.	Moderate: slope, wetness, depth to rock.	Slight	Moderate: depth to rock.
HfB Hiles Variant	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Slight	Moderate: large stones.
HnB Hixton	Slight	Slight	Moderate: slope, depth to rock.	Slight	Moderate: depth to rock.
HnC2 Hixton	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope, depth to rock.
HuB Humbird	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, depth to rock, percs slowly.	Slight	Moderate: droughty, depth to rock.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
HuC2----------------- Humbird	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight----------	Moderate: droughty, slope, depth to rock.
KeB------------------ Kert	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
La------------------- Lows	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
LoB------------------ Loyal	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
LoC2----------------- Loyal	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
Lp------------------- Lupton	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
MbB, McB------------- Magnor	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
MdB------------------ Mahtomedi	Moderate: small stones.	Moderate: too sandy.	Severe: small stones.	Moderate: too sandy.	Moderate: small stones.
MdC------------------ Mahtomedi	Moderate: slope, small stones.	Moderate: slope, too sandy.	Severe: slope, small stones.	Moderate: too sandy.	Moderate: small stones.
Me------------------- Markey	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
Mh------------------- Meehan	Severe: wetness.	Moderate: wetness, too sandy.	Severe: wetness.	Moderate: wetness, too sandy.	Moderate: wetness, droughty.
MkB------------------ Menahga	Moderate: too sandy.	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.	Moderate: droughty.
MkC------------------ Menahga	Moderate: slope, too sandy.	Moderate: slope, too sandy.	Severe: slope.	Moderate: too sandy.	Moderate: slope, droughty.
MlA------------------ Meridian	Slight----------	Slight----------	Slight----------	Slight----------	Slight.
MlB------------------ Meridian	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
MmA------------------ Meridian	Slight----------	Slight----------	Slight----------	Slight----------	Slight.
MrB------------------ Merrillan	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, depth to rock.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Mu----- Minocqua	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
MvA----- Moundville	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Slight-----	Moderate: droughty.
Na----- Newson	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
NtB----- Northfield	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight-----	Severe: depth to rock.
NtC2----- Northfield	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Slight-----	Severe: depth to rock.
NtD2----- Northfield	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope.	Severe: slope, depth to rock.
Oe----- Oesterle	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: large stones, wetness, droughty.
Or----- Orion	Severe: flooding, wetness.	Moderate: flooding, wetness.	Severe: wetness, flooding.	Moderate: wetness, flooding.	Severe: flooding.
OsC2----- Otterholt	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
Pc*. Pits					
PdB----- Plainbo	Moderate: too sandy.	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.	Moderate: droughty, depth to rock.
PdC----- Plainbo	Moderate: slope, too sandy.	Moderate: slope, too sandy.	Severe: slope.	Moderate: too sandy.	Moderate: droughty, slope, depth to rock.
PdD----- Plainbo	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, too sandy.	Severe: slope.
Pv----- Plover	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
Px----- Poskin	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
Rb, Rc----- Rib	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
RfA----- Richford	Slight-----	Slight-----	Moderate: small stones.	Slight-----	Moderate: droughty.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
RoA, RoB Rosholt	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Moderate: small stones, droughty.
RoC2 Rosholt	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight	Moderate: small stones, droughty, slope.
RpA, RpB Rosholt	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Moderate: small stones, droughty.
RpC2 Rosholt	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight	Moderate: small stones, droughty, slope.
SaB Santiago	Slight	Slight	Moderate: slope.	Slight	Moderate: large stones.
SaC2 Santiago	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: large stones, slope.
SaD2 Santiago	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
SbA Sattre	Slight	Slight	Slight	Slight	Slight.
ScB Scott Lake	Slight	Slight	Moderate: slope, small stones.	Slight	Moderate: large stones, droughty.
SdA Scott Lake	Slight	Slight	Moderate: small stones.	Slight	Moderate: large stones, droughty.
SeB Seaton	Slight	Slight	Moderate: slope.	Slight	Slight.
SeC2 Seaton	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
SeD2 Seaton	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
SfA, SgA Seaton	Slight	Slight	Slight	Slight	Slight.
SgB Seaton	Slight	Slight	Moderate: slope.	Slight	Slight.
Sm Seelyeville	Severe: flooding, ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
So Shiffer	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
SrB Spencer	Slight	Slight	Moderate: slope.	Slight	Slight.
SrC2 Spencer	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
SsA Spencer	Slight	Slight	Slight	Slight	Slight.
SsB Spencer	Slight	Slight	Moderate: slope.	Slight	Slight.
TeB Tell	Slight	Slight	Moderate: slope.	Slight	Slight.
Ud. Udifluvents					
Ve Vesper	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Wb Warman Variant	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, droughty.
WeB Withee	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--WILDLIFE HABITAT

(See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
AfB----------------- Alban	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
AfC----------------- Alban	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
AgB----------------- Almena	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
AlB----------------- Amery	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
AlC----------------- Amery	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
AlD----------------- Amery	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
AlF----------------- Amery	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
AnB----------------- Antigo	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
AnC2---------------- Antigo	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
AoA----------------- Arenzville	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
ApB----------------- Arland	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
ApC2---------------- Arland	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
ApD2---------------- Arland	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
AsB----------------- Arland	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
AsC2---------------- Arland	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
AsD2---------------- Arland	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Au------------------ Auburndale	Very poor.	Poor	Poor	Fair	Good	Good	Good	Poor	Fair	Good.
Ba------------------ Barronett	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good.
Bb------------------ Barronett	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Very poor.	Very poor.	Good.
Be------------------ Beseman	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Very poor.	Very poor.	Good.

TABLE 10.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
BlA, BlB------------------ Billett	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
BlC2------------------ Billett	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
BmA------------------ Billett	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
BoE------------------ Boone	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
BpA------------------ Brill	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
BuA------------------ Burkhardt	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Cb------------------ Cable	Very poor.	Poor	Poor	Fair	Fair	Good	Good	Poor	Fair	Good.
CdB------------------ Campia	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
CdC2------------------ Campia	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
CdD2------------------ Campia	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
CeA------------------ Caryville	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
CkA, CkB, CkC2----- Chetek	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
CkD2*:										
Chetek-------------	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Mahtomedi----------	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
CkE*:										
Chetek-------------	Very poor.	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Mahtomedi----------	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Cm------------------ Comstock	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
CuA------------------ Crystal Lake	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
ElB, ElC2----------- Eleva	Good	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Fair	Very poor.
ElD2------------------ Eleva	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
EmB---------------- Elkmound	Fair	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
EmC2, EmD2--------- Elkmound	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
EmE---------------- Elkmound	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Eo----------------- Elm Lake	Very poor.	Poor	Poor	Fair	Fair	Good	Good	Poor	Fair	Good.
FaB---------------- Fallcreek	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
FbB---------------- Flambeau	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
FbC2--------------- Flambeau	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Fm----------------- Fordum	Very poor.	Very poor.	Poor	Fair	Fair	Good	Good	Very poor.	Fair	Good.
FnB---------------- Freeon	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
FnC2--------------- Freeon	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
FrA---------------- Friendship	Poor	Fair	Good	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
GaB---------------- Gale	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
GaC2--------------- Gale	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
GaD2--------------- Gale	Poor	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Gr----------------- Greenwood	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Ha----------------- Halder	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
HeB---------------- Hiles	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
HfB---------------- Hiles Variant	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
HnB---------------- Hixton	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
HnC2--------------- Hixton	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
HuB, HuC2------------- Humbird	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Poor.
KeB------------------- Kert	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
La-------------------- Lows	Fair	Good	Good	Good	Fair	Good	Good	Good	Good	Good.
LoB------------------- Loyal	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
LoC2------------------ Loyal	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Lp-------------------- Lupton	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
MbB------------------- Magnor	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
McB------------------- Magnor	Very poor.	Fair	Good	Good	Good	Poor	Poor	Fair	Good	Poor.
MdB, MdC-------------- Mahtomedi	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
Me-------------------- Markey	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Mh-------------------- Meehan	Poor	Fair	Good	Fair	Fair	Fair	Poor	Poor	Fair	Poor.
MkB, MkC-------------- Menahga	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
MlA, MlB-------------- Meridian	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
MmA------------------- Meridian	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
MrB------------------- Merrillan	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Mu-------------------- Minocqua	Very poor.	Poor	Poor	Fair	Fair	Good	Good	Poor	Fair	Good.
MvA------------------- Moundville	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
Na-------------------- Newson	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
NtB, NtC2------------- Northfield	Poor	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
NtD2------------------ Northfield	Very poor.	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat	
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife
Oe: Oesterle	Fair	Good	Good	Fair	Fair	Poor	Poor	Good	Fair
Or: Orion	Good	Good	Good	Good	Good	Good	Fair	Good	Good
OsC2: Otterholt	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good
Pc*. Pits									
PdB: Plainbo	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor
PdC, PdD: Plainbo	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor
Pv: Plover	Good	Good	Good	Good	Good	Poor	Poor	Good	Good
Px: Poskin	Good	Good	Good	Good	Good	Poor	Poor	Good	Good
Rb: Rib	Good	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair
Rc: Rib	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Very poor.	Very poor.
RfA: Richford	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair
RoA, RoB: Rosholt	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good
RoC2: Rosholt	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good
RpA, RpB: Rosholt	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good
RpC2: Rosholt	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good
SaB: Santiago	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good
SaC2, SaD2: Santiago	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good
SbA: Sattre	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good
ScB, SdA: Scott Lake	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good
SeB, SeC2: Seaton	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good
SeD2: Seaton	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
SfA, SgA, SgB Seaton	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Sm Seelyeville	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Very poor.	Poor	Good.
So Shiffer	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
SrB Spencer	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
SrC2 Spencer	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
SsA, SsB Spencer	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
TeB Tell	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Ud. Udifluvents										
Ve Vesper	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Wb Warman Variant	Fair	Good	Good	Fair	Fair	Fair	Fair	Good	Good	Fair.
WeB Withee	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
AfB Alban	Severe: cutbanks cave.	Slight	Moderate: wetness.	Moderate: slope.	Moderate: frost action.	Slight.
AfC Alban	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
AgB Almena	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
AlB Amery	Moderate: dense layer.	Slight	Slight	Moderate: slope.	Moderate: frost action.	Moderate: droughty.
AlC Amery	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: droughty, slope.
AlD, AlF Amery	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
AnB Antigo	Severe: cutbanks cave.	Slight	Slight	Slight	Severe: low strength, frost action.	Slight.
AnC2 Antigo	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope.
AoA Arenzville	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding, frost action.	Moderate: flooding.
ApB Arland	Severe: cutbanks cave.	Slight	Moderate: depth to rock.	Moderate: slope.	Slight	Moderate: depth to rock.
ApC2 Arland	Severe: cutbanks cave.	Moderate: slope.	Moderate: depth to rock, slope.	Severe: slope.	Moderate: slope.	Moderate: slope, depth to rock.
ApD2 Arland	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
AsB Arland	Severe: cutbanks cave.	Slight	Moderate: depth to rock.	Moderate: slope.	Slight	Moderate: depth to rock.
AsC2 Arland	Severe: cutbanks cave.	Moderate: slope.	Moderate: depth to rock, slope.	Severe: slope.	Moderate: slope.	Moderate: slope, depth to rock.
AsD2 Arland	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Au Auburndale	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: low strength, ponding, frost action.	Severe: ponding.
Ba Barronett	Severe: cutbanks cave, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: low strength, ponding.	Severe: ponding.
Bb Barronett	Severe: cutbanks cave, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: low strength, ponding, flooding.	Severe: ponding.
Be Beseman	Severe: excess humus, ponding.	Severe: flooding, ponding, low strength.	Severe: flooding, ponding.	Severe: flooding, ponding, low strength.	Severe: ponding, frost action, low strength.	Severe: excess humus, ponding.
BlA Billett	Severe: cutbanks cave.	Slight	Slight	Slight	Moderate: frost action.	Moderate: droughty.
BlB Billett	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Moderate: frost action.	Moderate: droughty.
BlC2 Billett	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: droughty, slope.
BmA Billett	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Moderate: frost action.	Moderate: droughty.
BoE Boone	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.
BpA Brill	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: wetness.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
BuA Burkhardt	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Moderate: droughty.
Cb Cable	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, frost action.	Severe: ponding.
CdB Campia	Moderate: cutbanks cave.	Slight	Slight	Moderate: slope.	Severe: low strength, frost action.	Slight.
CdC2 Campia	Moderate: cutbanks cave, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope.
CdD2 Campia	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope, frost action.	Severe: slope.
CeA Caryville	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.	Moderate: droughty.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
CkA Chetek	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Moderate: large stones, droughty.
CkB Chetek	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Moderate: large stones, droughty.
CkC2 Chetek	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: large stones, droughty, slope.
CkD2*, CkE*: Chetek	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Mahtomedi	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Cm Comstock	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
CuA Crystal Lake	Moderate: cutbanks cave, wetness.	Moderate: shrink-swell.	Moderate: wetness.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
ElB Eleva	Severe: cutbanks cave.	Slight	Moderate: depth to rock.	Moderate: slope.	Moderate: frost action.	Moderate: small stones, droughty.
ElC2 Eleva	Severe: cutbanks cave.	Moderate: slope.	Moderate: depth to rock, slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: small stones, droughty, slope.
ElD2 Eleva	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
EmB Elkmound	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock, frost action.	Severe: depth to rock.
EmC2 Elkmound	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope, frost action.	Severe: depth to rock.
EmD2, EmE Elkmound	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.
Eo Elm Lake	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
FaB Fallcreek	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action.	Moderate: large stones, wetness.
FbB Flambeau	Moderate: wetness.	Slight	Moderate: wetness.	Moderate: slope.	Moderate: low strength, frost action.	Moderate: large stones.
FbC2 Flambeau	Moderate: wetness, slope.	Moderate: slope.	Moderate: wetness, slope.	Severe: slope.	Moderate: low strength, slope, frost action.	Moderate: large stones, slope.
Fm Fordum	Severe: cutbanks cave, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: ponding, flooding, frost action.	Severe.
FnB Freeon	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Moderate: wetness, frost action.	Slight.
FnC2 Freeon	Severe: wetness.	Moderate: wetness, slope.	Severe: wetness.	Severe: slope.	Moderate: wetness, slope, frost action.	Moderate: slope.
FrA Friendship	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Slight	Moderate: droughty.
GaB Gale	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength, frost action.	Moderate: depth to rock.
GaC2 Gale	Severe: cutbanks cave.	Moderate: shrink-swell, slope.	Moderate: depth to rock, slope, shrink-swell.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope, depth to rock.
GaD2 Gale	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope, frost action.	Severe: slope.
Gr Greenwood	Severe: excess humus, ponding.	Severe: ponding, low strength.	Severe: ponding, low strength.	Severe: ponding, low strength.	Severe: ponding, frost action, subsides.	Severe: ponding, excess humus.
Ha Halder	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action.	Moderate: wetness.
HeB Hiles	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Severe: frost action.	Moderate: depth to rock.
HfB Hiles Variant	Moderate: too clayey, wetness.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Moderate: large stones.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
HnB--------------- Hixton	Severe: cutbanks cave.	Slight---------	Moderate: depth to rock.	Moderate: slope.	Moderate: frost action.	Moderate: depth to rock.
HnC2-------------- Hixton	Severe: cutbanks cave.	Moderate: slope.	Moderate: depth to rock, slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope, depth to rock.
HuB--------------- Humbird	Severe: cutbanks cave.	Slight---------	Moderate: wetness, depth to rock.	Moderate: slope.	Moderate: frost action.	Moderate: droughty, depth to rock.
HuC2-------------- Humbird	Severe: cutbanks cave.	Moderate: slope.	Moderate: wetness, depth to rock, slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: droughty, slope, depth to rock.
KeB--------------- Kert	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action.	Moderate: wetness.
La---------------- Lows	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, frost action.	Severe: ponding.
LoB--------------- Loyal	Moderate: dense layer, wetness.	Slight---------	Moderate: wetness.	Moderate: slope.	Moderate: frost action.	Slight.
LoC2-------------- Loyal	Moderate: dense layer, wetness, slope.	Moderate: slope.	Moderate: wetness, slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
Lp---------------- Lupton	Severe: excess humus, ponding.	Severe: ponding, low strength.	Severe: ponding, low strength.	Severe: ponding, low strength.	Severe: ponding, frost action, subsides.	Severe: ponding, excess humus.
MbB, McB---------- Magnor	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.
MdB--------------- Mahtomedi	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Slight---------	Moderate: small stones
MdC--------------- Mahtomedi	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: small stones
Me---------------- Markey	Severe: cutbanks cave, excess humus, ponding.	Severe: ponding, low strength.	Severe: ponding.	Severe: ponding, low strength.	Severe: ponding, frost action, subsides.	Severe: ponding, excess humus
Mh---------------- Meehan	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness, frost action.	Moderate: wetness, droughty.
MkB--------------- Menahga	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Slight---------	Moderate: droughty.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
MkC Menahga	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope, droughty.
MlA Meridian	Severe: cutbanks cave.	Slight	Slight	Slight	Moderate: frost action.	Slight.
MlB Meridian	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Moderate: frost action.	Slight.
MmA Meridian	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Moderate: frost action.	Slight.
MrB Merrillan	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness, depth to rock.
Mu Minocqua	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, frost action.	Severe: ponding.
MvA Moundville	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: droughty.
Na Newson	Severe: cutbanks cave, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding.
NtB Northfield	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock.	Severe: depth to rock.
NtC2 Northfield	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope.	Severe: depth to rock.
NtD2 Northfield	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.
Oe Oesterle	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action.	Moderate: large stones, wetness, droughty.
Or Orion	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, flooding, frost action.	Severe: flooding.
OsC2 Otterholt	Moderate: dense layer, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope.
Pc*. Pits						
PdB Plainbo	Severe: cutbanks cave.	Slight	Moderate: depth to rock.	Moderate: slope.	Slight	Moderate: droughty, depth to rock.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
PdC----------------- Plainbo	Severe: cutbanks cave.	Moderate: slope.	Moderate: depth to rock, slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope, depth to rock.
PdD----------------- Plainbo	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Pv------------------ Plover	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action.	Moderate: wetness.
Px------------------ Poskin	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
Rb, Rc------------- Rib	Severe: cutbanks cave, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: ponding, flooding, frost action.	Severe: ponding.
RfA----------------- Richford	Severe: cutbanks cave.	Slight----------	Slight----------	Slight----------	Slight----------	Moderate: droughty.
RoA----------------- Rosholt	Severe: cutbanks cave.	Slight----------	Slight----------	Slight----------	Moderate: frost action.	Moderate: small stones, droughty.
RoB----------------- Rosholt	Severe: cutbanks cave.	Slight----------	Slight----------	Moderate: slope.	Moderate: frost action.	Moderate: small stones, droughty.
RoC2--------------- Rosholt	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: small stones, droughty, slope.
RpA--- ------------ Rosholt	Severe: cutbanks cave.	Slight----------	Slight----------	Slight----------	Moderate: frost action.	Moderate: small stones, droughty.
RpB----------------- Rosholt	Severe: cutbanks cave.	Slight----------	Slight----------	Moderate: slope.	Moderate: frost action.	Moderate: small stones, droughty.
RpC2--------------- Rosholt	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: small stones, droughty, slope.
SaB----------------- Santiago	Slight----------	Slight----------	Slight----------	Moderate: slope.	Moderate: frost action.	Moderate: large stones.
SaC2--------------- Santiago	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: large stones, slope.
SaD2--------------- Santiago	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
SbA Sattre	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Slight.
ScB, SdA Scott Lake	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Moderate: frost action.	Moderate: large stones, droughty.
SeB Seaton	Slight	Slight	Slight	Moderate: slope.	Severe: low strength, frost action.	Slight.
SeC2 Seaton	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope.
SeD2 Seaton	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope, frost action.	Severe: slope.
SfA Seaton	Moderate: cutbanks cave, wetness.	Slight	Moderate: wetness.	Slight	Severe: low strength, frost action.	Slight.
SgA Seaton	Severe: cutbanks cave.	Slight	Slight	Slight	Severe: low strength, frost action.	Slight.
SgB Seaton	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Severe: low strength, frost action.	Slight.
Sm Seelyeville	Severe: excess humus, ponding.	Severe: flooding, ponding, subsides.	Severe: flooding, ponding, subsides.	Severe: flooding, ponding, subsides.	Severe: ponding, subsides.	Severe: ponding, excess humus.
So Shiffer	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action.	Moderate: wetness.
SrB Spencer	Moderate: dense layer, wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength, frost action.	Slight.
SrC2 Spencer	Moderate: dense layer, wetness, slope.	Moderate: shrink-swell, slope.	Moderate: wetness, slope, shrink-swell.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope.
SsA Spencer	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Severe: low strength, frost action.	Slight.
SsB Spencer	Severe: cutbanks cave.	Slight	Moderate: wetness.	Moderate: slope.	Severe: low strength, frost action.	Slight.
TeB Tell	Severe: cutbanks cave.	Moderate: shrink-swell.	Slight	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Ud. Udifluvents						
Ve---------------- Vesper	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: low strength, ponding, frost action.	Severe: ponding.
Wb---------------- Warman Variant	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness, frost action.	Moderate: wetness, droughty.
WeB--------------- Withee	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
AfB Alban	Severe: wetness.	Severe: wetness.	Moderate: wetness, too sandy.	Slight	Fair: too sandy, wetness, thin layer.
AfC Alban	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too sandy.	Moderate: slope.	Fair: too sandy, slope, thin layer.
AgB Almena	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: small stones, wetness.
AlB Amery	Severe: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Poor: small stones.
AlC Amery	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Poor: small stones.
AlD, AlF Amery	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope, small stones.
AnB Antigo	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
AnC2 Antigo	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
AoA Arenzville	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: wetness.
ApB Arland	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock.
ApC2 Arland	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock.
ApD2 Arland	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, slope.
AsB Arland	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
AsC2 Arland	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock.
AsD2 Arland	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, slope.
Au Auburndale	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: ponding.
Ba Barronett	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, too sandy.	Severe: ponding.	Poor: ponding.
Bb Barronett	Severe: flooding, ponding, percs slowly.	Severe: flooding, ponding.	Severe: flooding, ponding, too sandy.	Severe: flooding, ponding.	Poor: ponding.
Be Beseman	Severe: ponding, percs slowly.	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: ponding, seepage.	Poor: ponding, excess humus.
BlA, BlB Billett	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
BlC2 Billett	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
BmA Billett	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
BoE Boone	Severe: depth to rock, poor filter, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, seepage, too sandy.
BpA Brill	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, small stones.
BuA Burkhardt	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, small stones.
Cb Cable	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: small stones, ponding.
CdB Campia	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
CdC2 Campia	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
CdD2 Campia	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
CeA Caryville	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
CkA, CkB Chetek	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
CkC2 Chetek	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
CkD2*, CkE*: Chetek	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, small stones.
Mahtomedi	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, small stones.
Cm Comstock	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
CuA Crystal Lake	Severe: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Fair: wetness.
ElB Eleva	Severe: depth to rock, poor filter.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock.
ElC2 Eleva	Severe: depth to rock, poor filter.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock.
ElD2 Eleva	Severe: depth to rock, poor filter, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, slope.
EmB Elkmound	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
EmC2---------------- Elkmound	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock.
EmD2, EmE----------- Elkmound	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, slope.
Eo------------------ Elm Lake	Severe: depth to rock, ponding, percs slowly.	Severe: seepage, depth to rock, ponding.	Severe: depth to rock, ponding, too sandy.	Severe: depth to rock, seepage, ponding.	Poor: depth to rock, seepage, too sandy.
FaB----------------- Fallcreek	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
FbB----------------- Flambeau	Severe: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Fair: large stones, wetness.
FbC2---------------- Flambeau	Severe: wetness, percs slowly.	Severe: slope, wetness.	Moderate: wetness, slope.	Moderate: wetness, slope.	Fair: large stones, slope, wetness.
Fm------------------ Fordum	Severe: flooding, ponding, poor filter.	Severe: seepage, flooding.	Severe: flooding, seepage, ponding.	Severe: flooding, seepage, ponding.	Poor: seepage, too sandy, ponding.
FnB----------------- Freeon	Severe: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Fair: small stones, wetness.
FnC2---------------- Freeon	Severe: wetness, percs slowly.	Severe: slope, wetness.	Moderate: wetness, slope.	Moderate: wetness, slope.	Fair: wetness, small stones, slope.
FrA----------------- Friendship	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
GaB----------------- Gale	Severe: depth to rock, poor filter.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock.
GaC2---------------- Gale	Severe: depth to rock, poor filter.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock.
GaD2---------------- Gale	Severe: depth to rock, slope, poor filter.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, slope.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Gr Greenwood	Severe: ponding.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, excess humus.	Severe: seepage, ponding.	Poor: ponding, excess humus.
Ha Halder	Severe: wetness, poor filter.	Severe: wetness, seepage.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, small stones.
HeB Hiles	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock.
HfB Hiles Variant	Severe: wetness, percs slowly.	Moderate: seepage, depth to rock, slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock, wetness.	Poor: too clayey, hard to pack.
HnB Hixton	Severe: depth to rock, poor filter.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock.
HnC2 Hixton	Severe: depth to rock, poor filter.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock.
HuB Humbird	Severe: depth to rock, wetness, percs slowly.	Severe: seepage, depth to rock.	Severe: depth to rock, too sandy.	Severe: depth to rock, seepage.	Poor: depth to rock, too sandy.
HuC2 Humbird	Severe: depth to rock, wetness, percs slowly.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, too sandy.	Severe: depth to rock, seepage.	Poor: depth to rock, too sandy.
KeB Kert	Severe: wetness, percs slowly.	Severe: seepage.	Severe: wetness.	Severe: seepage, wetness.	Poor: hard to pack, wetness.
La Lows	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, ponding.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
LoB Loyal	Severe: wetness.	Severe: wetness.	Moderate: wetness, too clayey.	Moderate: wetness.	Fair: too clayey, wetness.
LoC2 Loyal	Severe: wetness.	Severe: slope, wetness.	Moderate: wetness, slope, too clayey.	Moderate: wetness, slope.	Fair: too clayey, slope, wetness.
Lp Lupton	Severe: ponding.	Severe: seepage, excess humus, ponding.	Severe: ponding, excess humus.	Severe: seepage, ponding.	Poor: ponding, excess humus.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
MbB, McB----------- Magnor	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
MdB---------------- Mahtomedi	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
MdC---------------- Mahtomedi	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
Me----------------- Markey	Severe: ponding, poor filter.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
Mh----------------- Meehan	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
MkB---------------- Menahga	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
MkC---------------- Menahga	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
MlA, MlB----------- Meridian	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
MmA---------------- Meridian	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
MrB---------------- Merrillan	Severe: depth to rock, wetness, percs slowly.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Poor: depth to roc hard to pack wetness.
Mu----------------- Minocqua	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, small stones
MvA---------------- Moundville	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
Na----------------- Newson	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, ponding.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
NtB Northfield	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock.
NtC2 Northfield	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock.
NtD2 Northfield	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.
Oe Oesterle	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, small stones.
Or Orion	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
OsC2 Otterholt	Severe: percs slowly.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
Pc*. Pits					
PdB Plainbo	Severe: depth to rock, poor filter.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock, seepage, too sandy.
PdC Plainbo	Severe: depth to rock, poor filter.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock, seepage, too sandy.
PdD Plainbo	Severe: depth to rock, poor filter, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, seepage, too sandy.
Pv Plover	Severe: wetness.	Severe: wetness.	Severe: wetness, too sandy.	Severe: wetness.	Poor: too sandy, wetness.
Px Poskin	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: wetness, thin layer.
Rb, Rc Rib	Severe: flooding, ponding, poor filter.	Severe: seepage, flooding, ponding.	Severe: flooding, seepage, ponding.	Severe: flooding, seepage, ponding.	Poor: seepage, too sandy, small stones.
RfA Richford	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
RoA, RoB------------ Rosholt	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
RoC2---------------- Rosholt	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
RpA, RpB------------ Rosholt	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
RpC2---------------- Rosholt	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
SaB----------------- Santiago	Moderate: percs slowly.	Moderate: seepage, slope.	Slight-----------	Slight-----------	Fair: small stones.
SaC2---------------- Santiago	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: small stones, slope.
SaD2---------------- Santiago	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
SbA----------------- Sattre	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
ScB, SdA------------ Scott Lake	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, small stones.
SeB----------------- Seaton	Slight-----------	Moderate: seepage, slope.	Slight-----------	Slight-----------	Good.
SeC2---------------- Seaton	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
SeD2---------------- Seaton	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
SfA----------------- Seaton	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: wetness.
SgA, SgB------------ Seaton	Slight-----------	Severe: seepage.	Severe: seepage.	Slight-----------	Fair: thin layer.
Sm------------------ Seelyeville	Severe: ponding, subsides.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding.	Severe: seepage, ponding.	Poor: ponding, excess humus.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
So Shiffer	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
SrB Spencer	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: wetness.
SrC2 Spencer	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: wetness.	Severe: wetness.	Fair: slope, wetness.
SsA, SsB Spencer	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage.	Slight	Fair: wetness, thin layer.
TeB Tell	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Ud. Udifluvents					
Ve Vesper	Severe: ponding, percs slowly.	Severe: ponding.	Severe: depth to rock, ponding, too clayey.	Severe: ponding.	Poor: too clayey, too sandy, ponding.
Wb Warman Variant	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, small stones.
WeB Withee	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--CONSTRUCTION MATERIALS

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
AfB------------------- Alban	Good-----------------	Probable-------------	Improbable: too sandy.	Good.
AfC------------------- Alban	Good-----------------	Probable-------------	Improbable: too sandy.	Fair: slope.
AgB------------------- Almena	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
AlB------------------- Amery	Good-----------------	Probable-------------	Probable-------------	Poor: area reclaim, small stones.
AlC------------------- Amery	Good-----------------	Probable-------------	Probable-------------	Poor: small stones, area reclaim.
AlD------------------- Amery	Fair: slope.	Probable-------------	Probable-------------	Poor: small stones, slope, area reclaim.
AlF------------------- Amery	Poor: slope.	Probable-------------	Probable-------------	Poor: small stones, slope, area reclaim.
AnB, AnC2------------- Antigo	Good-----------------	Probable-------------	Probable-------------	Poor: area reclaim.
AoA------------------- Arenzville	Good-----------------	Improbable: excess fines.	Improbable: excess fines.	Good.
ApB------------------- Arland	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, small stones.
ApC2------------------ Arland	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, small stones, slope.
ApD2------------------ Arland	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
AsB------------------- Arland	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, small stones.
AsC2------------------ Arland	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, small stones, slope.
AsD2------------------ Arland	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Au Auburndale	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Ba, Bb Barronett	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Be Beseman	Poor: wetness.	Improbable: excess humus.	Improbable: excess humus.	Poor: excess humus, wetness.
BlA, BlB Billett	Good	Probable	Probable	Fair: small stones, area reclaim.
BlC2 Billett	Good	Probable	Probable	Fair: small stones, area reclaim, slope.
BmA Billett	Good	Probable	Probable	Fair: small stones, area reclaim.
BoE Boone	Poor: depth to rock, slope.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, slope.
BpA Brill	Fair: wetness.	Probable	Probable	Poor: small stones, area reclaim.
BuA Burkhardt	Good	Probable	Probable	Poor: small stones, area reclaim.
Cb Cable	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, wetness.
CdB Campia	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
CdC2 Campia	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
CdD2 Campia	Fair: slope, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
CeA Caryville	Good	Probable	Improbable: too sandy.	Poor: thin layer.
CkA, CkB, CkC2 Chetek	Good	Probable	Probable	Poor: too sandy, small stones, area reclaim.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
CkD2*:				
Chetek	Fair: slope.	Probable	Probable	Poor: too sandy, small stones, area reclaim.
Mahtomedi	Fair: slope.	Probable	Probable	Poor: too sandy, small stones, area reclaim.
CkE*:				
Chetek	Poor: slope.	Probable	Probable	Poor: too sandy, small stones, area reclaim.
Mahtomedi	Poor: slope.	Probable	Probable	Poor: too sandy, small stones, area reclaim.
Cm Comstock	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
CuA Crystal Lake	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
ElB, ElC2 Eleva	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
ElD2 Eleva	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
EmB, EmC2 Elkmound	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones.
EmD2 Elkmound	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
EmE Elkmound	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
Eo Elm Lake	Poor: depth to rock, wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: wetness.
FaB Fallcreek	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
FbB, FbC2 Flambeau	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Fm------------------------ Fordum	Poor: wetness.	Probable-------------	Improbable: too sandy.	Poor: small stones, wetness.
FnB, FnC2--------------- Freeon	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
FrA----------------------- Friendship	Fair: wetness.	Probable-------------	Improbable: too sandy.	Poor: too sandy.
GaB----------------------- Gale	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, thin layer.
GaC2---------------------- Gale	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, thin layer, slope.
GaD2---------------------- Gale	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Gr------------------------ Greenwood	Poor: wetness, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess humus, wetness.
Ha------------------------ Halder	Fair: wetness.	Probable-------------	Probable-------------	Poor: small stones, area reclaim.
HeB----------------------- Hiles	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, thin layer.
HfB----------------------- Hiles Variant	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
HnB----------------------- Hixton	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock.
HnC2---------------------- Hixton	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, slope.
HuB, HuC2--------------- Humbird	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
KeB----------------------- Kert	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy, small stones.
La------------------------ Lows	Poor: wetness.	Probable-------------	Improbable: too sandy.	Poor: wetness.
LoB----------------------- Loyal	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
LoC2 Loyal	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones, slope.
Lp Lupton	Poor: wetness, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess humus, wetness.
MbB, McB Magnor	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, wetness.
MdB, MdC Mahtomedi	Good	Probable	Probable	Poor: too sandy, small stones, area reclaim.
Me Markey	Poor: wetness.	Probable	Improbable: too sandy.	Poor: excess humus, wetness.
Mh Meehan	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
MkB, MkC Menahga	Good	Probable	Improbable: too sandy.	Poor: too sandy.
MlA, MlB, MmA Meridian	Good	Probable	Improbable: too sandy.	Fair: thin layer.
MrB Merrillan	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Mu Minocqua	Poor: wetness.	Probable	Probable	Poor: small stones, area reclaim.
MvA Moundville	Fair: wetness.	Probable	Improbable: too sandy.	Fair: too sandy, thin layer.
Na Newson	Poor: wetness.	Probable	Improbable: too sandy.	Poor: wetness, too sandy.
NtB, NtC2 Northfield	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones.
NtD2 Northfield	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
Oe Oesterle	Fair: wetness.	Probable	Probable	Poor: small stones, area reclaim.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Or------------------- Orion	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
OsC2----------------- Otterholt	Good-----------------	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, slope.
Pc*. Pits				
PdB, PdC------------- Plainbo	Poor: depth to rock.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy.
PdD------------------ Plainbo	Poor: depth to rock.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, slope.
Pv------------------- Plover	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer.
Px------------------- Poskin	Fair: wetness.	Probable-------------	Probable-------------	Poor: area reclaim.
Rb, Rc--------------- Rib	Poor: wetness.	Probable-------------	Probable-------------	Poor: area reclaim, wetness.
RfA------------------ Richford	Good-----------------	Probable-------------	Probable-------------	Fair: too sandy.
RoA, RoB, RoC2, RpA, RpB, RpC2------------ Rosholt	Good-----------------	Probable-------------	Probable-------------	Poor: small stones, area reclaim.
SaB, SaC2------------ Santiago	Good-----------------	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
SaD2----------------- Santiago	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
SbA------------------ Sattre	Good-----------------	Probable-------------	Improbable: too sandy.	Poor: small stones, area reclaim.
ScB, SdA------------- Scott Lake	Fair: wetness.	Probable-------------	Probable-------------	Poor: small stones, area reclaim.
SeB------------------ Seaton	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
SeC2----------------- Seaton	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
SeD2----------------- Seaton	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
SfA------------------ Seaton	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
SgA, SgB-------------- Seaton	Good----------------	Probable-------------	Improbable: too sandy.	Good.
Sm------------------- Seelyeville	Poor: wetness, low strength.	Improbable: excess humus.	Improbable: excess humus.	Poor: excess humus, wetness.
So------------------- Shiffer	Fair: wetness.	Probable-------------	Improbable: too sandy.	Fair: thin layer.
SrB------------------ Spencer	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim.
SrC2----------------- Spencer	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, slope.
SsA, SsB------------- Spencer	Good----------------	Probable-------------	Probable-------------	Fair: area reclaim.
TeB------------------ Tell	Good----------------	Probable-------------	Improbable: too sandy.	Fair: thin layer.
Ud. Udifluvents				
Ve------------------- Vesper	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
Wb------------------- Warman Variant	Fair: wetness.	Probable-------------	Probable-------------	Poor: small stones, area reclaim.
WeB------------------ Withee	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation]

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
AfB----------------- Alban	Moderate: seepage, slope.	Severe: seepage, piping.	Deep to water	Soil blowing, rooting depth, slope.	Too sandy------	Rooting depth.
AfC----------------- Alban	Severe: slope.	Severe: seepage, piping.	Deep to water	Soil blowing, rooting depth, slope.	Slope, too sandy.	Slope, rooting depth.
AgB----------------- Almena	Moderate: seepage, slope.	Severe: seepage, piping, wetness.	Frost action, slope.	Wetness, slope, erodes easily.	Erodes easily, wetness.	Wetness, erodes easily.
AlB----------------- Amery	Moderate: slope.	Severe: seepage, piping.	Deep to water	Droughty, soil blowing, rooting depth.	Soil blowing---	Rooting depth, droughty.
AlC, AlD, AlF----- Amery	Severe: slope.	Severe: seepage, piping.	Deep to water	Slope, droughty, soil blowing.	Slope, soil blowing.	Slope, droughty.
AnB----------------- Antigo	Severe: seepage.	Severe: seepage, piping.	Deep to water	Slope, erodes easily.	Erodes easily, too sandy.	Erodes easily.
AnC2---------------- Antigo	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Slope, erodes easily.	Slope, erodes easily, too sandy.	Slope, erodes easily.
AoA----------------- Arenzville	Moderate: seepage.	Severe: piping.	Deep to water	Erodes easily, flooding.	Erodes easily	Erodes easily.
ApB----------------- Arland	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing, depth to rock, slope.	Depth to rock, soil blowing.	Depth to rock.
ApC2, ApD2--------- Arland	Severe: seepage, slope.	Severe: piping.	Deep to water	Soil blowing, depth to rock, slope.	Slope, depth to rock, soil blowing.	Slope, depth to rock.
AsB----------------- Arland	Severe: seepage.	Severe: piping.	Deep to water	Depth to rock, slope.	Depth to rock	Depth to rock.
AsC2, AsD2--------- Arland	Severe: seepage, slope.	Severe: piping.	Deep to water	Depth to rock, slope.	Slope, depth to rock.	Slope, depth to rock.
Au------------------ Auburndale	Moderate: seepage.	Severe: thin layer, ponding.	Ponding, frost action.	Ponding, erodes easily.	Erodes easily, ponding.	Wetness, erodes easily.
Ba------------------ Barronett	Moderate: seepage.	Severe: ponding.	Ponding, frost action.	Ponding--------	Ponding--------	Wetness.
Bb------------------ Barronett	Moderate: seepage.	Severe: ponding.	Ponding, flooding, frost action.	Ponding, flooding.	Ponding--------	Wetness.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
Be---------------- Beseman	Severe: seepage.	Severe: excess humus, ponding.	Ponding, subsides, frost action.	Ponding, soil blowing, rooting depth.	Ponding, soil blowing.	Wetness, rooting depth.
BlA--------------- Billett	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, soil blowing.	Too sandy, soil blowing.	Droughty.
BlB--------------- Billett	Severe: seepage.	Severe: seepage, piping.	Deep to water	Slope, droughty, soil blowing.	Too sandy, soil blowing.	Droughty.
BlC2-------------- Billett	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Slope, droughty, soil blowing.	Slope, too sandy, soil blowing.	Slope, droughty.
BmA--------------- Billett	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, soil blowing.	Too sandy, soil blowing.	Droughty, rooting depth.
BoE--------------- Boone	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Slope, droughty, fast intake.	Slope, depth to rock, too sandy.	Slope, droughty, depth to rock.
BpA--------------- Brill	Severe: seepage.	Severe: seepage, piping.	Cutbanks cave, frost action.	Wetness--------	Erodes easily, wetness, too sandy.	Erodes easily.
BuA--------------- Burkhardt	Severe: seepage.	Severe: seepage.	Deep to water	Droughty, soil blowing.	Soil blowing, too sandy.	Droughty.
Cb---------------- Cable	Slight----------	Severe: piping, ponding.	Ponding, frost action.	Ponding, droughty, rooting depth.	Large stones, erodes easily, ponding.	Large stones, wetness, erodes easily.
CdB--------------- Campia	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
CdC2, CdD2-------- Campia	Severe: slope.	Moderate: piping.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
CeA--------------- Caryville	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, soil blowing.	Too sandy, soil blowing.	Droughty.
CkA--------------- Chetek	Severe: seepage.	Severe: seepage.	Deep to water	Droughty, soil blowing.	Too sandy, soil blowing.	Droughty, rooting depth.
CkB--------------- Chetek	Severe: seepage.	Severe: seepage.	Deep to water	Slope, droughty, soil blowing.	Too sandy, soil blowing.	Droughty, rooting depth.
CkC2-------------- Chetek	Severe: seepage, slope.	Severe: seepage.	Deep to water	Slope, droughty, soil blowing.	Slope, too sandy, soil blowing.	Slope, droughty, rooting depth.
CkD2*, CkE*: Chetek------------	Severe: seepage, slope.	Severe: seepage.	Deep to water	Slope, droughty, soil blowing.	Slope, too sandy, soil blowing.	Slope, droughty, rooting depth.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
CkD2*, CkE*: Mahtomedi	Severe: seepage, slope.	Severe: seepage.	Deep to water	Slope, droughty, fast intake.	Slope, too sandy, soil blowing.	Slope, droughty, rooting depth.
Cm Comstock	Moderate: seepage.	Severe: piping, wetness.	Frost action, cutbanks cave.	Wetness, erodes easily.	Erodes easily, wetness.	Wetness, erodes easily.
CuA Crystal Lake	Moderate: seepage.	Severe: piping.	Frost action	Wetness, erodes easily.	Erodes easily, wetness.	Erodes easily.
ElB Eleva	Severe: seepage.	Severe: piping.	Deep to water	Slope, droughty, soil blowing.	Depth to rock, soil blowing.	Droughty, depth to rock.
ElC2, ElD2 Eleva	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope, droughty, soil blowing.	Slope, depth to rock, soil blowing.	Slope, droughty, depth to rock.
EmB Elkmound	Severe: depth to rock.	Severe: piping.	Deep to water	Depth to rock, slope.	Depth to rock	Depth to rock.
EmC2, EmD2, EmE Elkmound	Severe: depth to rock, slope.	Severe: piping.	Deep to water	Depth to rock, slope.	Slope, depth to rock.	Slope, depth to rock.
Eo Elm Lake	Severe: seepage.	Severe: seepage, piping, ponding.	Ponding, percs slowly, depth to rock.	Ponding, droughty, fast intake.	Depth to rock, erodes easily, ponding.	Wetness, erodes easily, droughty.
FaB Fallcreek	Moderate: slope.	Severe: piping.	Frost action, slope.	Wetness, soil blowing, slope.	Wetness, soil blowing.	Wetness.
FbB Flambeau	Moderate: seepage, slope.	Moderate: piping, wetness.	Slope	Slope, wetness, rooting depth.	Wetness	Rooting depth.
FbC2 Flambeau	Severe: slope.	Moderate: piping, wetness.	Slope	Slope, wetness, rooting depth.	Slope, wetness.	Slope, rooting depth.
Fm Fordum	Severe: seepage.	Severe: seepage, piping, ponding.	Ponding, flooding, frost action.	Ponding, droughty, flooding.	Ponding, too sandy.	Wetness, droughty.
FnB Freeon	Moderate: seepage, slope.	Severe: seepage, piping.	Slope, percs slowly.	Wetness, slope.	Erodes easily, wetness.	Erodes easily, rooting depth.
FnC2 Freeon	Severe: slope.	Severe: seepage, piping.	Slope, percs slowly.	Wetness, slope.	Slope, erodes easily, wetness.	Slope, erodes easily, rooting depth.
FrA Friendship	Severe: seepage.	Severe: seepage, piping.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Droughty.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
GaB---------------- Gale	Severe: seepage.	Severe: thin layer.	Deep to water	Depth to rock, slope, erodes easily.	Depth to rock, erodes easily.	Erodes easily, depth to rock.
GaC2, GaD2--------- Gale	Severe: seepage, slope.	Severe: thin layer.	Deep to water	Depth to rock, slope, erodes easily.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Gr----------------- Greenwood	Severe: seepage.	Severe: excess humus, ponding.	Ponding, frost action.	Ponding---------	Ponding---------	Wetness.
Ha----------------- Halder	Severe: seepage.	Severe: seepage, wetness.	Frost action, cutbanks cave.	Wetness, rooting depth.	Wetness, too sandy.	Wetness, rooting dept
HeB---------------- Hiles	Moderate: seepage, depth to rock, slope.	Severe: piping.	Depth to rock, frost action, slope.	Wetness, depth to rock, slope.	Depth to rock, erodes easily.	Erodes easily, depth to rock.
HfB---------------- Hiles Variant	Moderate: seepage, depth to rock, slope.	Moderate: thin layer, hard to pack, wetness.	Percs slowly, slope.	Slope, wetness, percs slowly.	Wetness, percs slowly.	Percs slowly.
HnB---------------- Hixton	Severe: seepage.	Severe: thin layer.	Deep to water	Depth to rock	Depth to rock	Depth to rock.
HnC2--------------- Hixton	Severe: seepage, slope.	Severe: thin layer.	Deep to water	Depth to rock	Slope, depth to rock.	Slope, depth to roc
HuB---------------- Humbird	Severe: seepage.	Severe: seepage, piping.	Percs slowly, depth to rock, slope.	Wetness, droughty.	Depth to rock, wetness.	Droughty, depth to roc
HuC2--------------- Humbird	Severe: seepage, slope.	Severe: seepage, piping.	Percs slowly, depth to rock, slope.	Wetness, droughty.	Slope, depth to rock, wetness.	Slope, droughty, depth to roc
KeB---------------- Kert	Severe: seepage.	Moderate: piping, hard to pack, wetness.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Erodes easily, wetness, percs slowly.	Wetness, erodes easi percs slowl
La----------------- Lows	Severe: seepage.	Severe: seepage, piping, ponding.	Ponding, frost action.	Ponding, rooting depth.	Ponding, too sandy.	Wetness, rooting dep
LoB---------------- Loyal	Moderate: seepage, slope.	Severe: thin layer.	Slope-----------	Wetness, rooting depth, slope.	Erodes easily, wetness.	Erodes easi rooting dep
LoC2--------------- Loyal	Severe: slope.	Severe: thin layer.	Slope-----------	Wetness, rooting depth, slope.	Slope, erodes easily, wetness.	Slope, erodes eas rooting de

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
Lp--------------- Lupton	Severe: seepage.	Severe: excess humus, ponding.	Ponding, subsides, frost action.	Ponding, soil blowing.	Ponding, soil blowing.	Wetness.
MbB--------------- Magnor	Moderate: seepage, slope.	Severe: piping, wetness.	Frost action, slope.	Wetness, rooting depth, slope.	Erodes easily, wetness.	Wetness, erodes easily, rooting depth.
McB--------------- Magnor	Moderate: seepage, slope.	Severe: piping, wetness.	Frost action, slope.	Wetness, rooting depth, slope.	Large stones, erodes easily, wetness.	Large stones, wetness, erodes easily.
MdB--------------- Mahtomedi	Severe: seepage.	Severe: seepage.	Deep to water	Slope, droughty, fast intake.	Too sandy, soil blowing.	Droughty, rooting depth.
MdC--------------- Mahtomedi	Severe: seepage, slope.	Severe: seepage.	Deep to water	Slope, droughty, fast intake.	Slope, too sandy, soil blowing.	Slope, droughty, rooting depth.
Me--------------- Markey	Severe: seepage.	Severe: seepage, piping, ponding.	Ponding, subsides, frost action.	Ponding, soil blowing.	Ponding, too sandy, soil blowing.	Wetness.
Mh--------------- Meehan	Severe: seepage.	Severe: seepage, piping, wetness.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty.
MkB--------------- Menahga	Severe: seepage.	Severe: seepage, piping.	Deep to water	Slope, droughty, fast intake.	Too sandy, soil blowing.	Droughty.
MkC--------------- Menahga	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Slope, droughty, fast intake.	Slope, too sandy, soil blowing.	Slope, droughty.
MlA--------------- Meridian	Severe: seepage.	Severe: seepage, piping.	Deep to water	Favorable------	Too sandy------	Favorable.
MlB--------------- Meridian	Severe: seepage.	Severe: seepage, piping.	Deep to water	Slope----------	Too sandy------	Favorable.
MmA--------------- Meridian	Severe: seepage.	Severe: seepage, piping.	Deep to water	Favorable------	Too sandy------	Favorable.
MrB--------------- Merrillan	Moderate: depth to rock, slope.	Severe: thin layer, wetness.	Percs slowly, depth to rock, frost action.	Wetness, percs slowly.	Depth to rock, wetness, soil blowing.	Wetness, depth to rock, rooting depth.
Mu--------------- Minocqua	Severe: seepage.	Severe: seepage, piping, ponding.	Ponding, frost action.	Ponding, droughty.	Erodes easily, ponding, too sandy.	Wetness, erodes easily, droughty.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
MvA----------------- Moundville	Severe: seepage.	Severe: seepage, piping.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Droughty.
Na------------------ Newson	Severe: seepage.	Severe: seepage, piping, ponding.	Ponding, cutbanks cave.	Ponding, droughty, fast intake.	Ponding, too sandy, soil blowing.	Wetness, droughty, rooting dept
NtB----------------- Northfield	Severe: depth to rock.	Severe: thin layer.	Deep to water	Depth to rock, slope.	Depth to rock	Depth to rock,
NtC2, NtD2---------- Northfield	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.	Slope, depth to rock.	Slope, depth to roc
Oe------------------ Oesterle	Severe: seepage.	Severe: seepage, piping, wetness.	Frost action, cutbanks cave.	Wetness, droughty, soil blowing.	Wetness, too sandy, soil blowing.	Wetness, droughty.
Or------------------ Orion	Moderate: seepage.	Severe: piping, wetness.	Flooding, frost action.	Wetness, erodes easily.	Erodes easily, wetness.	Wetness, erodes eas
OsC2---------------- Otterholt	Severe: slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes eas
Pc*. Pits						
PdB----------------- Plainbo	Severe: seepage.	Severe: seepage, piping.	Deep to water	Slope, droughty, fast intake.	Depth to rock, too sandy.	Droughty, depth to ro
PdC, PdD------------ Plainbo	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Slope, droughty, fast intake.	Slope, depth to rock, too sandy.	Slope, droughty, depth to ro
Pv------------------ Plover	Moderate: seepage.	Severe: piping, wetness.	Frost action, cutbanks cave.	Wetness----------	Erodes easily, wetness, too sandy.	Wetness, erodes eas
Px------------------ Poskin	Severe: seepage.	Severe: thin layer, wetness.	Frost action---	Wetness, rooting depth.	Erodes easily, wetness.	Wetness, erodes eas rooting de
Rb, Rc-------------- Rib	Severe: seepage.	Severe: seepage, ponding.	Ponding, flooding, frost action.	Ponding, flooding.	Ponding, too sandy.	Wetness, rooting de
RfA----------------- Richford	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
RoA----------------- Rosholt	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, soil blowing.	Too sandy, soil blowing.	Droughty.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
RoB--------------- Rosholt	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, soil blowing, slope.	Too sandy, soil blowing.	Droughty.
RoC2-------------- Rosholt	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Droughty, soil blowing, slope.	Slope, too sandy, soil blowing.	Slope, droughty.
RpA--------------- Rosholt	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty-------	Too sandy------	Droughty.
RpB--------------- Rosholt	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, slope.	Too sandy------	Droughty.
RpC2-------------- Rosholt	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Droughty, slope.	Slope, too sandy.	Slope, droughty.
SaB--------------- Santiago	Moderate: seepage, slope.	Severe: piping.	Deep to water	Rooting depth, slope, erodes easily.	Erodes easily	Erodes easily, rooting depth.
SaC2, SaD2-------- Santiago	Severe: slope.	Severe: piping.	Deep to water	Rooting depth, slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily, rooting depth.
SbA--------------- Sattre	Severe: seepage.	Severe: seepage.	Deep to water	Favorable------	Too sandy------	Favorable.
ScB--------------- Scott Lake	Severe: seepage.	Severe: seepage, piping.	Large stones, slope, cutbanks cave.	Slope, wetness, droughty.	Large stones, wetness, too sandy.	Large stones, droughty, rooting depth.
SdA--------------- Scott Lake	Severe: seepage.	Severe: seepage, piping.	Large stones, cutbanks cave.	Wetness, droughty.	Large stones, wetness, too sandy.	Large stones, droughty, rooting depth.
SeB--------------- Seaton	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
SeC2, SeD2-------- Seaton	Severe: slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
SfA--------------- Seaton	Moderate: seepage.	Moderate: piping, wetness.	Deep to water	Erodes easily	Erodes easily	Erodes easily.
SgA--------------- Seaton	Severe: seepage.	Severe: thin layer.	Deep to water	Erodes easily	Erodes easily	Erodes easily.
SgB--------------- Seaton	Severe: seepage.	Severe: thin layer.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
Sm---------------- Seelyeville	Severe: seepage.	Severe: excess humus, ponding.	Ponding, subsides.	Ponding--------	Ponding--------	Wetness.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
So------------------ Shiffer	Severe: seepage.	Severe: seepage, piping, wetness.	Frost action, cutbanks cave.	Wetness---------	Wetness, too sandy.	Wetness.
SrB----------------- Spencer	Moderate: seepage, slope.	Severe: piping.	Frost action, slope.	Wetness, slope, erodes easily.	Erodes easily, wetness.	Erodes easily.
SrC2---------------- Spencer	Severe: slope.	Severe: piping.	Frost action, slope.	Wetness, slope, erodes easily.	Slope, erodes easily, wetness.	Slope, erodes easily.
SsA----------------- Spencer	Severe: seepage.	Severe: piping.	Deep to water	Erodes easily	Erodes easily	Erodes easily.
SsB----------------- Spencer	Severe: seepage.	Severe: piping.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
TeB----------------- Tell	Severe: seepage.	Severe: seepage, piping.	Deep to water	Slope, erodes easily.	Erodes easily, too sandy.	Erodes easily.
Ud. Udifluvents						
Ve------------------ Vesper	Moderate: depth to rock.	Severe: seepage, piping, ponding.	Ponding, percs slowly, frost action.	Ponding, percs slowly, erodes easily.	Erodes easily, ponding, too sandy.	Wetness, erodes easi percs slowl
Wb------------------ Warman Variant	Severe: seepage.	Severe: seepage, wetness.	Cutbanks cave	Wetness, droughty, soil blowing.	Wetness, too sandy, soil blowing.	Wetness, droughty.
WeB----------------- Withee	Moderate: slope.	Severe: wetness.	Frost action, slope.	Wetness, rooting depth, slope.	Erodes easily, wetness.	Wetness, erodes eas rooting de

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--ENGINEERING INDEX PROPERTIES

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
AfB----------------- Alban	0-8	Fine sandy loam	ML, SM	A-2, A-4	0	100	100	65-85	30-55	<20	1-4
	8-24	Loamy sand, fine sandy loam, silt loam.	SM, ML, CL-ML, SM-SC	A-2, A-4	0	100	100	50-100	15-90	<25	NP-7
	24-38	Fine sandy loam, very fine sandy loam, sandy loam.	SM, SM-SC, ML, CL-ML	A-2, A-4	0	100	100	60-100	30-75	<25	NP-7
	38-60	Stratified silt to fine sand.	SM, ML, CL-ML, SP-SM	A-4, A-2, A-3	0	100	100	70-100	5-100	<25	NP-6
AfC----------------- Alban	0-8	Fine sandy loam	ML, SM	A-2, A-4	0	100	100	60-85	30-55	<20	1-4
	8-24	Loamy sand, fine sandy loam, silt loam.	SM, ML, CL-ML, SM-SC	A-2, A-4	0	100	100	50-100	15-90	<25	NP-7
	24-38	Fine sandy loam, very fine sandy loam, sandy loam.	SM, SM-SC, ML, CL-ML	A-2, A-4	0	100	100	60-100	30-75	<25	NP-7
	38-60	Stratified silt to fine sand.	SM, ML, SM-SC, SP-SM	A-4, A-2, A-3	0	100	100	70-100	5-100	<25	NP-6
AgB----------------- Almena	0-9	Silt loam--------	CL	A-4, A-6	0	100	100	90-100	85-100	25-32	7-13
	9-24	Silt loam, silt	CL, CL-ML	A-4, A-6	0	100	100	90-100	85-100	19-34	4-14
	24-42	Silt loam, silty clay loam.	CL	A-6, A-4	0	100	100	90-100	85-100	28-37	9-16
	42-48	Silt loam--------	CL	A-4, A-6	0	100	100	90-100	80-100	28-35	9-15
	48-60	Gravelly sandy loam, gravelly loam, sandy loam.	SM, SC, ML, CL	A-2, A-4, A-1, A-6	0-5	70-100	50-95	30-90	15-70	<30	NP-15
AlB, AlC, AlD, AlF----------------- Amery	0-2	Sandy loam--------	SM, ML, SM-SC, CL-ML	A-4, A-2, A-1	0-5	80-100	75-100	45-85	15-55	<23	NP-6
	2-32	Sandy loam, fine sandy loam, gravelly loam.	SM, SC, CL, ML	A-4, A-2, A-1	3-15	50-100	50-95	30-95	15-75	<28	NP-9
	32-60	Loamy sand, fine sandy loam, gravelly sandy loam.	SM, SC, SP-SM, SP-SC	A-4, A-2, A-1	3-15	50-100	50-95	25-85	10-50	<28	NP-9
AnB, AnC2----------- Antigo	0-10	Silt loam--------	ML, CL-ML	A-4	0-3	95-100	90-100	90-100	85-95	<25	2-7
	10-28	Silt loam--------	CL	A-6, A-4	0-3	95-100	90-100	90-100	85-95	25-35	9-15
	28-32	Sandy loam, loam, gravelly loamy sand.	SM, GM, ML, GM-GC	A-2, A-4, A-1, A-3	0-9	50-100	45-100	25-95	7-75	<35	NP-15
	32-60	Stratified sand to gravel.	SP, SP-SM, GP, GP-GM	A-2, A-3, A-1	0-9	30-100	25-100	10-70	1-12	---	NP
AoA----------------- Arenzville	0-8	Silt loam--------	ML, CL-ML, CL	A-4	0	100	100	95-100	80-95	20-30	4-10
	8-50	Silt loam, silty clay loam.	CL	A-6, A-7	0	100	100	90-100	85-95	30-45	10-20
	50-60	Silt loam--------	CL, CL-ML	A-4	0	75-100	75-100	75-100	70-95	20-30	5-10

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
ApB, ApC2, ApD2-- Arland	0-7	Sandy loam-------	SM, SM-SC, ML, CL-ML	A-2, A-4, A-1	0	80-100	75-100	45-85	20-55	<25	1-6
	7-25	Sandy loam, fine sandy loam, loam.	CL, SC, CL-ML, SM-SC	A-4, A-2	0	80-100	75-100	45-95	25-75	20-30	4-1
	25-29	Sandy loam, fine sandy loam, loamy sand.	SM, SM-SC, ML, CL-ML	A-2, A-4, A-1	0	80-100	75-100	35-85	10-75	<25	NP-6
	29-35	Loamy sand, sand, loamy fine sand.	SM, SP-SM	A-2, A-3, A-1, A-4	0	80-100	75-100	35-85	5-45	---	NP
	35	Weathered bedrock	---	---	---	---	---	---	---	---	---
AsB, AsC2, AsD2-- Arland	0-7	Loam------------	CL-ML, SM-SC	A-4	0	80-100	75-100	65-100	45-100	20-25	4-
	7-25	Sandy loam, fine sandy loam, loam.	CL, SC, CL-ML, SM-SC	A-4, A-2	0	80-100	75-100	45-95	25-75	20-30	4-1
	25-29	Sandy loam, fine sandy loam, loamy sand.	SM, SM-SC, ML, CL-ML	A-2, A-4, A-1	0	80-100	75-100	35-85	10-75	<25	NP-6
	29-35	Loamy sand, sand, loamy fine sand.	SM, SP-SM	A-2, A-3, A-1, A-4	0	80-100	75-100	35-85	5-45	---	NP
	35	Weathered bedrock	---	---	---	---	---	---	---	---	---
Au--------------- Auburndale	0-6	Silt loam--------	CL, ML, CL-ML	A-4, A-6	0	100	95-100	90-100	90-100	<35	2-1
	6-38	Silt loam--------	CL	A-6	0	100	95-100	90-100	85-100	25-35	10-1
	38-45	Loam, silt loam, sandy loam.	CL, CL-ML, SC, SM-SC	A-4, A-6, A-2, A-1	0-5	75-100	65-100	40-100	20-90	20-30	4-1
	45-60	Sandy loam, gravelly sandy loam, loam.	SM, ML, CL-ML, SM-SC	A-4, A-2, A-1	0-5	75-95	65-95	40-90	20-70	<25	NP-
Ba--------------- Barronett	0-9	Silt loam--------	ML, CL, CL-ML	A-4	0	100	100	90-100	75-95	15-26	1-6
	9-18	Silt loam, loam, very fine sandy loam.	ML, CL, CL-ML	A-4, A-6	0	100	100	85-100	50-95	<35	NP-1
	18-40	Silt loam, silty clay loam, loam.	CL	A-6, A-7, A-4	0	100	100	90-100	85-100	25-45	7-2
	40-60	Stratified silt loam to very fine sand.	CL	A-4, A-6	0	100	100	80-100	70-95	25-35	7-1
Bb--------------- Barronett	0-8	Mucky silt loam	ML, CL, CL-ML	A-4	0	100	100	90-100	75-95	15-26	1-6
	8-30	Silt loam, silty clay loam, loam.	CL	A-6, A-7, A-4	0	100	100	90-100	85-100	25-45	7-2
	30-60	Stratified silt loam to very fine sand.	CL	A-4, A-6	0	100	100	80-100	70-95	25-35	7-1
Be--------------- Beseman	0-20	Sapric material	PT	---	0	---	---	---	---	---	---
	20-60	Loam, sandy loam, silt loam.	CL, ML, SM, SC	A-2, A-4, A-6	0-2	75-100	65-100	40-95	25-75	15-30	NP-1

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
B1A, B1B, B1C2----- Billett	0-9	Sandy loam-------	SM, SM-SC, SC	A-2, A-4	0	100	95-100	60-100	25-50	<26	NP-8
	9-30	Sandy loam, fine sandy loam.	SM, SM-SC, SC	A-2, A-4	0-10	90-100	90-100	60-100	25-50	<28	NP-9
	30-36	Loamy sand, sandy loam, fine sandy loam.	SM	A-2, A-4	0-10	75-100	75-100	75-90	20-45	<21	NP-4
	36-60	Stratified fine sand to sand.	SM, SP-SM	A-2, A-4, A-1	0-10	80-100	75-100	40-95	10-40	---	NP
BmA--------------- Billett	0-8	Sandy loam-------	SM, SC, SM-SC	A-4, A-2	0	100	95-100	60-100	25-50	<26	NP-8
	9-37	Fine sandy loam, sandy loam.	SM, SC, SM-SC	A-4, A-2	0-10	90-100	90-100	60-100	25-50	<28	NP-9
	37-60	Fine sand, sand	SM, SP-SM	A-2, A-4, A-1	0-10	80-100	75-100	40-95	10-40	---	NP
BoE--------------- Boone	0-2	Fine sand--------	SM, SP-SM	A-2, A-3, A-1	0	75-100	75-100	40-80	5-35	---	NP
	2-22	Fine sand, sand, loamy sand.	SM, SP-SM, SP	A-2, A-3, A-1	0	75-100	75-100	30-75	2-35	---	NP
	22	Weathered bedrock	---	---	---	---	---	---	---	---	---
BpA--------------- Brill	0-8	Silt loam--------	ML, CL-ML	A-4	0-2	95-100	90-100	90-100	85-90	<25	2-7
	8-13	Silt loam, silt	ML, CL-ML	A-4	0-2	95-100	90-100	90-100	85-100	<23	2-6
	13-25	Silt loam, silty clay loam.	CL	A-6, A-7	0-2	95-100	90-100	85-100	85-95	25-45	10-23
	25-34	Loam, gravelly sandy loam, gravelly loamy sand.	ML, CL-ML, GM, GM-GC	A-4, A-2, A-1	0-6	50-100	45-100	30-95	15-75	<25	NP-7
	34-60	Stratified sand to gravel.	SP, SP-SM, GP, GP-GM	A-2, A-3, A-1	0-7	30-100	25-100	10-70	1-12	---	NP
BuA--------------- Burkhardt	0-11	Sandy loam-------	SM, SM-SC	A-2, A-4	0	95-100	90-100	55-70	25-40	<26	2-7
	11-17	Sandy loam, loam, coarse sandy loam.	SM, ML, SC, CL	A-2, A-4	0	95-100	85-100	50-95	25-75	15-30	2-10
	17-60	Stratified coarse sand to gravel.	SP, SP-SM, GP, GP-GM	A-1	0	50-85	45-85	20-35	1-5	---	NP
Cb---------------- Cable	0-4	Silt loam--------	CL, CL-ML, SC, SM-SC	A-4	0-25	75-100	75-100	60-100	35-90	<26	5-10
	4-16	Silt loam, loam, fine sandy loam.	SM, SC, ML, CL	A-2, A-4	0-25	75-100	75-100	50-100	30-90	<33	NP-10
	16-26	Loam, silt loam, gravelly sandy loam.	SM, SC, ML, CL	A-2, A-4, A-1	0-25	65-100	60-100	35-95	20-75	<27	NP-8
	26-60	Sandy loam, gravelly sandy loam.	SM, GM, ML, CL-ML	A-2, A-1, A-4	0-25	65-100	60-100	40-90	20-70	<23	NP-6
CdB, CdC2, CdD2-- Campia	0-8	Silt loam--------	CL-ML, CL, ML	A-4, A-6	0	100	100	90-100	85-100	19-32	3-13
	8-42	Silt loam, silty clay loam.	CL	A-6, A-4	0	100	100	90-100	85-100	25-40	9-20
	42-60	Silt loam, silt	CL, CL-ML, ML	A-4, A-6	0	100	100	85-100	65-100	19-38	3-19

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
CeA--------------- Caryville	0-16	Sandy loam-------	SM, ML, SM-SC, CL-ML	A-2, A-4	0	90-100	90-100	55-85	25-55	<25	1-4
	16-60	Sand, loamy sand	SP, SM, SP-SM	A-2, A-3, A-4	0	75-100	70-100	65-90	1-50	---	NP
CkA, CkB, CkC2--- Chetek	0-8	Sandy loam-------	SM, SM-SC	A-2, A-4	0-15	80-100	75-100	45-70	25-40	<23	NP-6
	8-17	Sandy loam, loam	ML, CL, SM, SC	A-2, A-4, A-6, A-1	0-15	80-100	75-100	45-95	10-75	<31	NP-1
	17-60	Stratified sand to gravel.	SP, SP-SM	A-1	0-15	55-95	45-75	15-50	1-5	---	NP
CkD2*, CkE*: Chetek----------	0-8	Sandy loam-------	SM, SM-SC	A-2, A-4	0-15	80-100	75-100	45-70	25-40	<23	NP-6
	8-17	Sandy loam, loam	ML, CL, SM, SC	A-2, A-4, A-6, A-1	0-15	80-100	75-100	45-95	10-75	<31	NP-1
	17-60	Stratified sand to gravel.	SP, SP-SM	A-1	0-15	55-95	45-75	15-50	1-5	---	NP
Mahtomedi-------	0-8	Loamy sand-------	SM, SM-SC	A-2, A-1	0-2	95-100	60-90	40-86	15-30	<20	NP-4
	8-24	Sand, loamy sand, gravelly coarse sand.	SP-SM, SM	A-2, A-3, A-1	0-15	70-95	50-90	30-75	5-15	<20	NP
	24-60	Gravelly sand, sand and gravel.	SP, SM, SP-SM	A-2, A-3, A-1	0-15	55-95	50-90	30-70	2-15	<20	NP
Cm--------------- Comstock	0-8	Silt loam--------	CL-ML, CL, ML	A-4, A-6	0	100	100	85-100	65-100	15-35	3-1
	8-48	Silt loam, silty clay loam.	CL	A-6, A-4	0	100	100	90-100	85-100	25-40	9-1
	48-60	Silt loam--------	CL, ML, CL-ML	A-4, A-6	0	100	100	85-100	65-95	<35	NP-1
CuA-------------- Crystal Lake	0-8	Silt loam--------	CL-ML, CL, ML	A-4, A-6	0	100	100	85-100	70-100	19-32	3-1
	8-44	Silt loam, silty clay loam.	CL	A-6, A-4	0	100	100	90-100	85-100	25-40	9-1
	44-60	Silt loam, silt	CL, CL-ML, ML	A-4, A-6	0	100	100	85-100	75-100	19-32	3-1
ElB, ElC2, ElD2-- Eleva	0-9	Sandy loam-------	SM, SM-SC, ML, CL-ML	A-2, A-4	0	75-100	70-100	40-90	20-55	<25	NP-7
	9-36	Sandy loam, fine sandy loam, loam.	CL, SC, ML, SM	A-2, A-4	0-2	75-100	70-100	40-95	20-75	<30	3-9
	36-40	Sand, fine sand, loamy sand.	SM, SP-SM	A-2, A-3, A-1	0-15	75-100	70-100	35-85	5-35	<20	NP-4
	40	Weathered bedrock	---	---	---	---	---	---	---	---	---
EmB, EmC2, EmD2, EmE------------- Elkmound	0-7	Loam-------------	SM, SM-SC, ML, CL-ML	A-4	0-7	70-100	70-100	60-100	45-80	23	NP-6
	7-16	Sandy loam, loam	SM, SC, ML, CL	A-2, A-4, A-6, A-1	0-7	70-100	70-100	45-100	20-80	<30	NP-1
	16-19	Loamy fine sand	SM, SP-SM	A-2, A-1	0-7	70-100	70-100	35-75	10-30	--	NP
	19	Weathered bedrock, unweathered bedrock.	---	---	---	---	---	---	---	--	---

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Eo--------------- Elm Lake	0-4	Loamy sand--------	SM	A-2, A-4	0	100	100	50-90	15-40	---	NP
	4-23	Sand, loamy sand, fine sand.	SP-SM, SM	A-2, A-3	0	100	100	50-80	5-35	---	NP
	23-48	Silty clay loam, silty clay, clay loam.	CL	A-6, A-7	0	80-100	70-95	65-95	60-90	35-50	15-28
	48	Weathered bedrock	---	---	---	---	---	---	---	---	---
FaB--------------- Fallcreek	0-8	Sandy loam-------	SM, SM-SC	A-4, A-2	0-7	95-100	95-100	55-70	30-40	<23	NP-6
	8-40	Sandy loam, loam	CL, SC, ML, SM	A-4, A-2	0-7	90-100	85-100	50-95	25-75	<28	NP-9
	40-60	Loam, sandy loam	CL, SC, SM-SC, CL-ML	A-2, A-4, A-6, A-1	0-7	80-100	75-100	45-95	20-75	20-35	4-15
FbB, FbC2--------- Flambeau	0-8	Loam-------------	CL-ML, ML	A-4	0-15	95-100	95-100	80-100	55-90	<25	2-7
	8-17	Sandy loam, loam, silt loam.	SM, SM-SC, ML, CL-ML	A-4, A-2	0-15	95-100	95-100	55-100	25-90	<25	NP-7
	17-36	Loam, sandy clay loam, clay loam.	CL, SC	A-4, A-6	0-15	85-100	85-100	75-100	35-80	28-40	9-18
	36-60	Loam-------------	CL, ML, CL-ML	A-4	0-15	85-100	85-100	75-100	50-80	<30	NP-10
Fm---------------- Fordum	0-9	Loam-------------	ML, CL, SM, SC	A-4, A-6	0-15	80-100	75-100	65-100	45-95	20-35	3-15
	9-21	Silt loam, sandy loam, loamy sand.	SM, SC, ML, CL	A-2, A-4, A-1	0-15	80-100	75-100	45-95	20-75	<30	3-10
	21-60	Sand, loamy sand, sand and gravel.	SP, SM	A-3, A-2, A-1, A-4	0-15	80-100	75-100	35-80	2-45	---	NP
FnB, FnC2--------- Freeon	0-8	Silt loam--------	ML, CL, CL-ML	A-4	0-5	90-100	90-100	85-100	85-100	<30	1-10
	8-23	Silt loam--------	ML, CL, CL-ML	A-4	0-5	90-100	90-100	85-100	85-100	<30	1-10
	23-38	Loam, sandy loam, gravelly sandy loam.	SM, SC, ML, CL	A-4, A-6, A-2, A-1	0-15	65-100	65-95	35-90	10-70	<35	NP-15
	38-60	Sandy loam, loam, gravelly sandy loam.	SM, SC, ML, CL	A-4, A-2, A-6, A-1	0-15	65-95	65-95	35-90	10-70	<35	NP-15
FrA--------------- Friendship	0-8	Loamy sand-------	SM, SP-SM	A-1, A-2	0	75-100	75-100	40-75	12-30	---	NP
	8-36	Sand, loamy sand	SP-SM, SM, SP	A-1, A-2, A-3	0	75-100	75-100	40-75	3-30	---	NP
	36-60	Sand-------------	SP-SM, SM, SP	A-1, A-3, A-2	0	75-100	75-100	40-70	3-15	---	NP
GaB, GaC2, GaD2--- Gale	0-8	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	100	90-100	85-95	20-30	5-11
	8-30	Silt loam, silty clay loam.	CL	A-6, A-4, A-7	0	100	100	90-100	85-95	25-45	9-20
	30-36	Sand, loamy fine sand.	SM, SP-SM, SM-SC	A-3, A-2, A-1, A-4	0	85-100	85-100	45-75	5-40	<25	NP-7
	36	Weathered bedrock, unweathered bedrock.	---	---	---	---	---	---	---	---	---
Gr---------------- Greenwood	0-4	Fibric material	PT	A-8	0	---	---	---	---	---	---
	4-60	Hemic material---	PT	A-8	0	---	---	---	---	---	---

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Ha------------------ Halder	0-8	Loam-------------	CL, ML, SM, SC	A-4	0-3	80-100	75-100	65-100	45-95	15-30	NP-10
	8-28	Sandy clay loam, silt loam, loam.	CL, SC, SM, ML	A-6, A-4, A-2	0-3	80-100	75-100	60-100	25-95	<30	NP-1
	28-32	Sandy loam, gravelly sandy loam, loamy sand.	SM, SM-SC, SP-SM, GM	A-2, A-4, A-1	0-8	50-95	50-95	40-70	12-40	<25	NP-7
	32-60	Stratified sand to gravel.	SP, SM, GP, GM	A-1, A-2, A-3	0-10	30-90	30-90	15-70	1-25	---	NP
HeB------------------ Hiles	0-8	Silt loam--------	ML, CL, CL-ML	A-4	0	100	100	90-100	70-90	20-30	3-1
	8-22	Silt loam, silt	CL, ML, CL-ML	A-4	0	100	100	90-100	70-100	20-30	3-1
	22-26	Silt loam, silty clay loam.	CL	A-6	0	100	100	90-100	70-95	25-40	10-2
	26-30	Loam, clay loam, sandy clay loam.	CL, SC	A-6, A-4	0	95-100	85-100	70-95	35-75	25-40	8-2
	30	Weathered bedrock	---	---	---	---	---	---	---	---	---
HfB------------------ Hiles Variant	0-14	Loam-------------	CL, CL-ML	A-4, A-6	1-15	95-100	95-100	80-95	50-85	20-30	4-1
	14-40	Clay, silty clay loam, silty clay.	CH, CL	A-7	0	85-100	85-100	80-95	75-90	45-65	20-3
	40-48	Loam, clay loam	CL, SC	A-4, A-6, A-7	0	80-95	70-90	60-90	45-90	25-50	9-2
	48	Weathered bedrock	---	---	---	---	---	---	---	---	---
HnB, HnC2-------- Hixton	0-7	Loam-------------	CL, CL-ML	A-4	0	100	100	85-95	60-75	20-30	5-1
	7-24	Loam, sandy loam, sandy clay loam.	CL, SC	A-4, A-6, A-2	0	85-100	85-100	55-95	25-75	25-35	9-1
	24-34	Sand, loamy sand	SM, SP-SM, SP	A-1, A-3, A-2	0	85-100	85-100	45-80	4-30	---	NP
	34	Weathered bedrock, unweathered bedrock.	---	---	---	---	---	---	---	---	---
HuB, HuC2-------- Humbird	0-8	Sandy loam-------	SM, SM-SC, ML, CL-ML	A-2, A-4	0	90-100	90-100	55-85	25-55	<20	2-7
	8-25	Sandy loam, loamy sand, loam.	SM, SC, ML, CL	A-2, A-4	0	90-100	90-100	60-85	15-55	<28	NP-9
	25-36	Silty clay, clay, silty clay loam.	CL, CH, SC	A-7	0	90-100	90-100	80-100	40-95	43-66	21-3
	36	Weathered bedrock, unweathered bedrock.	---	---	---	---	---	---	---	---	---
KeB------------------ Kert	0-8	Silt loam--------	ML, CL-ML, CL	A-4	0	100	100	85-100	60-90	20-30	3-10
	8-22	Loam, sandy loam, silt loam.	ML, CL, SM, SC	A-2, A-4	0	100	100	60-100	30-90	<30	NP-1
	22-28	Loam, sandy loam, silty clay loam.	CL, SC, CH	A-6, A-7, A-2	0	85-100	85-100	70-100	30-95	30-55	15-30
	28-60	Stratified sand to silt.	CL, SC, CH	A-6, A-7, A-4, A-2	0	85-100	85-100	75-100	30-90	25-55	7-30

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
La--------------- Lows	0-9	Loam------------	ML, CL, CL-ML	A-4	0	100	95-100	85-95	60-75	<25	2-10
	9-16	Loam, sandy loam	ML, CL, SM, SM-SC	A-4, A-2	0	100	95-100	60-95	30-75	<25	2-10
	16-39	Loam, silt loam, sandy loam.	CL, SC	A-6	0	100	95-100	80-95	35-75	20-35	10-20
	39-60	Sand, loamy sand, fine sand.	SM, SP, SP-SM	A-2, A-3	0	100	95-100	50-90	3-30	---	NP
LoB, LoC2--------- Loyal	0-8	Silt loam--------	ML, CL, CL-ML	A-4	0	100	100	90-100	70-100	<25	3-10
	8-16	Silt loam, silt	ML, CL, CL-ML	A-4	0	100	100	90-100	70-100	20-30	3-10
	16-22	Silt loam--------	CL, ML, CL-ML	A-4, A-6	0	100	100	90-100	70-100	25-36	3-13
	22-44	Loam, sandy clay loam, clay loam.	SC, CL	A-4, A-6	0	80-100	80-100	70-95	35-90	25-40	9-20
	44-60	Loam, sandy clay loam, sandy loam.	SC, SM-SC, CL, CL-ML	A-2, A-4, A-6	0-5	80-100	80-100	55-85	25-60	20-35	5-15
Lp--------------- Lupton	0-60	Sapric material	PT	A-8	---	---	---	---	---	---	---
MbB-------------- Magnor	0-8	Silt loam--------	CL, CL-ML, ML	A-4	0-15	95-100	90-100	85-100	65-100	<28	2-10
	8-18	Silt loam, silt	CL, CL-ML, ML	A-4	0-15	95-100	90-100	85-100	65-100	<35	NP-10
	18-32	Loam, sandy loam, gravelly sandy loam.	ML, CL-ML, SM, SM-SC	A-2, A-4, A-1	0-15	75-100	70-100	40-90	20-70	<25	NP-7
	32-60	Sandy loam, loam, gravelly sandy loam.	ML, CL-ML, SM, SM-SC	A-2, A-4, A-1	0-15	75-100	70-100	40-90	20-70	<25	NP-6
McB-------------- Magnor	0-4	Stony silt loam	CL, CL-ML, ML	A-4	15-25	95-100	90-100	85-100	65-100	<28	2-10
	4-18	Silt loam, silt	CL, CL-ML, ML	A-4	0-15	95-100	90-100	85-100	65-100	<35	NP-10
	18-32	Loam, sandy loam, gravelly sandy loam.	ML, CL-ML, SM, SM-SC	A-2, A-4, A-1	0-15	75-100	70-95	40-90	20-70	<25	NP-7
	32-60	Sandy loam, loam, gravelly sandy loam.	ML, CL-ML, SM, SM-SC	A-2, A-4, A-1	0-15	75-100	70-95	40-90	20-70	<25	NP-6
MdB, MdC--------- Mahtomedi	0-8	Loamy sand-------	SM, SM-SC	A-2, A-1	0-2	95-100	60-100	40-86	15-30	<20	NP-4
	8-24	Sand, loamy sand, gravelly sand.	SP-SM, SM	A-2, A-3, A-1	0-15	70-95	50-100	30-75	5-15	<20	NP
	24-60	Gravelly sand, sand and gravel.	SP, SM, SP-SM	A-2, A-3, A-1	0-15	55-95	50-90	30-70	2-15	<20	NP
Me--------------- Markey	0-36	Sapric material	PT	A-8	---	---	---	---	---	---	---
	36-60	Sand, loamy sand, fine sand.	SP, SM, SP-SM	A-2, A-3	0	100	75-100	60-75	0-20	---	NP

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- tici inde
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Mh--------------- Meehan	0-8	Loamy sand-------	SM	A-2, A-1	0	90-100	75-100	40-90	15-30	---	NP
	8-30	Sand, loamy sand, loamy coarse sand.	SM, SP-SM, SP	A-1, A-2, A-3	0	90-100	75-100	40-90	3-30	---	NP
	30-60	Sand, coarse sand	SP, SP-SM	A-1, A-3, A-2	0	90-100	75-100	40-90	0-5	---	NP
MkB, MkC--------- Menahga	0-8	Loamy sand-------	SM, SP-SM	A-2	0	100	85-100	60-80	10-30	---	NP
	8-40	Sand-------------	SP, SP-SM	A-3, A-2, A-1	0	100	80-100	30-75	0-10	---	NP
	40-60	Sand-------------	SP, SP-SM	A-3, A-2, A-1	0	100	80-100	30-75	0-10	---	NP
MlA, MlB--------- Meridian	0-9	Loam-------------	ML, CL, CL-ML	A-4	0	100	100	85-95	60-75	19-30	2-1
	9-37	Loam, sandy loam, sandy clay loam.	CL, SC, SM-SC, CL-ML	A-4, A-6	0	100	100	80-95	35-75	20-35	4-1
	37-60	Sand, loamy sand	SM, SP, SP-SM	A-2, A-3	0	100	100	50-90	0-30	---	NP
MmA-------------- Meridian	0-9	Loam-------------	ML, CL, CL-ML	A-4	0	100	100	85-95	60-75	19-30	2-1
	9-26	Loam, sandy clay loam.	CL, SC, SM-SC, CL-ML	A-4, A-6	0	100	100	80-95	35-75	20-35	4-1
	26-32	Sandy loam, loamy sand.	SM, SM-SC, SC	A-4, A-2	0	100	100	50-90	15-45	<26	NP-
	32-60	Sand, loamy sand	SM, SP, SP-SM	A-2, A-3	0	100	100	50-90	0-30	---	NP
MrB-------------- Merrillan	0-7	Sandy loam-------	SM, SM-SC, ML, CL-ML	A-2, A-4	0	100	100	60-85	30-55	<25	1-4
	7-19	Sandy loam, loamy sand, sand.	SM, SM-SC, SP-SM	A-2, A-4	0	100	100	50-75	5-50	20-30	2-7
	19-48	Loam, clay loam, silty clay.	CL, CH, SC	A-6, A-7, A-2	0	90-100	85-100	70-100	30-95	35-70	15-4
	48	Weathered bedrock, unweathered bedrock.	---	---	---	---	---	---	---	---	---
Mu--------------- Minocqua	0-9	Loam-------------	CL, CL-ML, SC, SM-SC	A-4	0-7	80-100	75-100	60-100	45-90	20-30	5-1
	9-38	Silt loam, loam, sandy loam.	SC, SM-SC, CL, CL-ML	A-2, A-4, A-6	0-7	80-100	75-100	45-100	25-90	20-35	4-1
	38-60	Gravelly coarse sand, sand, sand and gravel.	SP, SM, GP, GM	A-1, A-3, A-2	0-7	35-100	30-100	5-70	0-30	---	NP
MvA-------------- Moundville	0-9	Loamy sand-------	SM	A-2, A-4	0	100	100	50-85	15-40	---	NP
	9-24	Loamy fine sand, loamy sand.	SM	A-2, A-4	0	100	100	50-85	15-40	---	NP
	24-60	Loamy fine sand, loamy sand, sand.	SM, SP-SM	A-2, A-3, A-4	0	95-100	95-100	50-85	5-40	---	NP

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Na----------------- Newson	0-9	Loamy sand--------	SM, SP-SM	A-2, A-1	0	80-100	75-100	40-85	12-35	---	NP
	9-44	Loamy sand, sand	SM, SP-SM, SP	A-2, A-3, A-1	0	80-100	75-100	45-75	3-30	---	NP
	44-60	Sand, loamy sand	SM, SP-SM, SP	A-2, A-3, A-1	0	80-100	75-100	45-75	3-30	---	NP
NtB, NtC2, NtD2-- Northfield	0-8	Silt loam---------	ML, CL, SM, SC	A-4	0	80-100	75-100	65-100	45-90	20-30	3-10
	8-18	Loam, silt loam	CL, SC, CL-ML, SM-SC	A-4, A-6	0-15	80-100	70-100	60-100	40-85	20-35	5-15
	18	Weathered bedrock, unweathered bedrock.	---	---	---	---	---	---	---	---	---
Oe----------------- Oesterle	0-7	Sandy loam-------	SM, SC, ML, CL	A-2, A-4, A-1	0-7	80-100	75-100	45-95	20-65	<26	3-8
	7-25	Sandy loam, loam, fine sandy loam.	CL-ML, CL, SM-SC, SC	A-2, A-4, A-1	0-7	75-100	70-100	40-95	20-75	20-30	4-10
	25-34	Sandy loam, loamy sand, gravelly loamy sand.	SM, SP-SM, SM-SC, GM	A-2, A-1	0-7	55-95	55-95	25-75	10-35	<23	NP-6
	34-60	Gravelly sand, sand, sand and gravel.	SW, SP, GW, GP	A-1, A-3, A-2	0-7	35-95	35-95	15-70	0-30	---	NP
Or----------------- Orion	0-7	Silt loam--------	CL, CL-ML	A-4	0	100	100	85-100	80-100	20-30	4-10
	7-32	Stratified silt loam to very fine sand.	CL, CL-ML	A-4	0	100	100	90-100	70-80	20-30	4-10
	32-51	Silt loam, silty clay loam.	CL, CL-ML	A-6, A-4	0	100	100	85-100	85-100	20-40	4-18
	51-60	Silt loam--------	CL, CL-ML	A-4	0	80-100	80-100	80-100	80-100	20-30	4-10
OsC2--------------- Otterholt	0-8	Silt loam--------	ML, CL-ML, CL	A-4	0	100	100	90-100	85-100	20-30	3-10
	8-43	Silt loam--------	CL, CL-ML, ML	A-6, A-4	0	100	100	90-100	85-100	25-40	4-20
	43-60	Sandy loam, loam, gravelly sandy loam.	ML, CL, SM, SC	A-2, A-4, A-6, A-1	0-4	60-100	55-90	30-85	15-65	<30	NP-14
Pc*. Pits											
PdB, PdC, PdD---- Plainbo	0-6	Loamy sand--------	SM	A-2	0	90-100	85-100	50-85	15-35	---	NP
	6-28	Sand, loamy sand, channery sand.	SP-SM, SM	A-2, A-3	0-15	60-100	55-100	50-75	5-35	---	NP
	28	Weathered bedrock	---	---	---	---	---	---	---	---	---
Pv----------------- Plover	0-14	Silt loam--------	ML, CL, CL-ML	A-4	0	100	100	85-100	60-80	20-30	3-10
	14-38	Fine sandy loam, very fine sandy loam, silt loam.	SM, ML, SM-SC, CL-ML	A-4	0	100	100	70-100	40-75	<20	1-5
	38-60	Stratified silt to fine sand.	SM, ML, CL-ML, SM-SC	A-4	0	100	100	65-100	40-70	<25	2-7

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Px--------------- Poskin	0-10	Silt loam--------	CL, CL-ML	A-4	0-3	95-100	90-100	90-100	85-90	20-30	5-10
	10-29	Silt loam, silt	CL	A-6, A-4	0-4	95-100	90-100	90-100	85-95	25-35	9-15
	29-38	Sandy loam, loam, gravelly loamy sand.	SM, SM-SC, ML, CL-ML	A-2, A-4, A-1	0-7	50-100	45-100	30-100	10-90	<25	NP-7
	38-60	Gravelly sand, coarse sand, sand and gravel.	SP, SP-SM, GP, GP-GM	A-1, A-2, A-3	0-7	30-100	25-100	10-90	1-15	---	NP
Rb--------------- Rib	0-8	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	90-100	85-100	20-30	4-11
	8-12	Silt loam--------	CL	A-4, A-6	0	100	100	90-100	85-100	25-30	8-11
	12-28	Silt loam, silty clay loam.	CL	A-6	0	100	90-100	90-100	85-100	30-40	10-2
	28-33	Loam, sandy loam, sandy clay loam.	CL, ML, SC, SM	A-2, A-4, A-6, A-1	0	75-100	70-100	45-90	20-75	17-40	1-
	33-60	Stratified sand to gravel.	SP, SP-SM, GP, GP-GM	A-2, A-3, A-1	0-3	50-90	40-85	25-55	2-10	---	NP
Rc--------------- Rib	0-15	Mucky silt loam	CL, CL-ML	A-4, A-6	0	100	100	90-100	85-100	20-30	4-1
	15-44	Silt loam, silty clay loam.	CL	A-6	0	100	90-100	90-100	85-100	30-40	10-
	44-60	Stratified sand to gravel.	SP, SP-SM, GP, GP-GM	A-2, A-3, A-1	0-3	50-90	40-85	25-55	2-10	---	NP
RfA-------------- Richford	0-8	Loamy sand--------	SM	A-2, A-4, A-1	0-5	75-100	75-100	40-90	12-40	---	NP
	8-22	Loamy sand, sand	SM, SP-SM, SP	A-1, A-2, A-3	0-5	75-100	75-100	40-90	3-30	---	NP
	22-30	Sandy loam, fine sandy loam.	SM, SM-SC, ML, CL-ML	A-2, A-4	0-10	75-100	75-100	50-90	15-55	<25	2-
	30-36	Loamy sand--------	SM	A-1, A-2	0-10	75-100	75-100	40-90	12-30	---	NP
	36-60	Sand, gravelly coarse sand.	SP, SP-SM, SM	A-1, A-2, A-3	0-10	55-100	55-100	30-95	1-15	---	NP
RoA, RoB, RoC2--- Rosholt	0-8	Sandy loam-------	SM, SM-SC	A-2, A-1, A-4	0-8	75-100	70-100	45-70	20-40	<25	NP-
	8-20	Sandy loam, loam, silt loam.	SM, ML, SM-SC, CL-ML	A-2, A-4, A-1	0-8	75-100	70-100	35-95	12-90	<25	NP-
	20-28	Sandy loam, loam	SC, SM, CL, ML	A-2, A-4, A-1, A-6	0-8	75-100	70-100	35-95	12-75	<30	NP-
	28-34	Gravelly loamy sand, sandy loam, gravelly sandy loam.	SM, GM, SP-SM, GP-GM	A-1, A-2, A-4	0-10	50-100	45-100	25-80	10-50	<25	NP-
	34-60	Stratified sand to gravel.	GP, SP, SP-SM, GP-GM	A-1, A-2, A-3	0-25	20-100	20-100	10-65	0-10	---	N
RpA, RpB, RpC2--- Rosholt	0-8	Loam------------	SM-SC, CL-ML, SM, ML	A-4	0-8	75-100	70-100	60-95	45-90	<25	3
	8-15	Sandy loam, loam, silt loam.	SM, ML, SM-SC, CL-ML	A-2, A-4, A-1	0-8	75-100	70-100	35-95	12-90	<25	N
	15-28	Sandy loam, loam	SC, SM, CL, ML	A-2, A-4, A-1, A-6	0-8	75-100	70-100	35-95	12-75	<30	N
	28-34	Gravelly loamy sand, loamy sand, gravelly sandy loam.	SM, GM, SP-SM, GP-GM	A-1, A-2, A-4	0-10	50-100	45-100	25-80	10-50	<25	N
	34-60	Stratified sand to gravel.	GP, SP, SP-SM, GP-GM	A-1, A-2, A-3	0-25	20-100	20-100	10-65	0-10	---	

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
SaB, SaC2, SaD2-- Santiago	0-7	Silt loam--------	ML, CL, CL-ML	A-4	0-7	95-100	90-100	85-100	85-100	<26	2-8
	7-13	Silt loam, silt	ML, CL-ML	A-4	0-7	95-100	90-100	85-100	85-100	<25	2-7
	13-19	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0-7	95-100	90-100	85-100	85-100	25-40	4-18
	19-30	Loam, sandy loam, gravelly fine sandy loam.	CL, SC	A-2, A-4, A-6	0-7	70-95	70-95	40-90	25-70	23-35	8-15
	30-60	Sandy loam, fine sandy loam, gravelly sandy loam.	SM, SC, ML, CL	A-2, A-4, A-6, A-1	0-7	70-95	70-95	30-90	20-70	<26	NP-13
SbA-------------- Sattre	0-9	Loam-------------	CL, CL-ML, ML	A-4	0	100	90-100	70-90	50-75	25-35	5-10
	9-30	Loam, sandy clay loam, clay loam.	CL, SC, CL-ML, SM-SC	A-4, A-6	0-5	85-100	80-100	70-95	40-60	20-35	5-15
	30-60	Gravelly sandy loam, gravelly sand, sand and gravel.	SW, SM, SP, SP-SM	A-1	2-10	80-90	50-85	20-40	3-25	---	NP
ScB-------------- Scott Lake	0-8	Sandy loam-------	SM, SM-SC, ML, CL-ML	A-2, A-4, A-1-b	0-7	85-100	75-100	45-95	20-65	<25	2-7
	8-36	Loam, sandy loam, fine sandy loam.	SC, CL, SM, ML	A-2, A-4, A-6	0-7	85-100	75-100	45-100	25-95	20-35	3-13
	36-60	Stratified sand to gravel.	SP, SM, GP, GM	A-1, A-2, A-3	0-35	30-95	30-95	20-95	3-25	---	NP
SdA-------------- Scott Lake	0-8	Loam-------------	ML, CL-ML, SM, SM-SC	A-4	0-7	85-100	75-100	65-100	45-95	<25	3-7
	8-26	Loam, sandy loam, fine sandy loam.	SC, CL, SM, ML	A-2, A-4, A-6	0-7	85-100	75-100	45-100	25-95	20-35	3-13
	26-36	Sandy loam, gravelly sandy loam, gravelly loamy sand.	SM, SW-SM, SP-SM, SM-SC	A-1, A-2, A-3, A-4	0-35	70-100	50-95	20-80	7-50	<25	NP-6
	36-60	Stratified sand to gravel.	SP, SM, GP, GM	A-1, A-2, A-3	0-35	30-95	30-95	20-95	3-25	---	NP
SeB, SeC2, SeD2-- Seaton	0-7	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	100	95-100	20-35	5-15
	7-42	Silt loam--------	CL, CL-ML	A-6, A-4	0	100	100	100	90-100	25-40	5-20
	42-60	Silt loam, silt	CL, CL-ML	A-4, A-6	0	100	100	100	90-100	25-40	5-20
SfA-------------- Seaton	0-9	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	100	95-100	20-35	6-16
	9-42	Silt loam--------	CL	A-6, A-4	0	100	100	100	90-100	28-40	9-21
	42-60	Silt loam, silt	CL	A-4, A-6	0	100	100	100	90-100	25-40	7-17
SgA, SgB--------- Seaton	0-8	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	100	95-100	24-33	6-13
	8-38	Silt loam--------	CL	A-4, A-6	0	100	100	95-100	90-100	28-38	9-18
	38-48	Silt loam, silt	CL-ML, ML	A-4	0	100	100	95-100	85-100	<25	NP-7
	48-60	Sand, loamy sand	SM, SP-SM, SP	A-2, A-3	0	100	100	50-75	0-30	---	NP
Sm--------------- Seelyeville	0-4	Hemic material---	PT	A-8	0	---	---	---	---	---	---
	4-60	Sapric material	PT	A-8	0	---	---	---	---	---	---

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	g/cc	In/hr	In/in	pH					Pct
AfB------------- Alban	0-8	3-8	1.35-1.65	0.6-2.0	0.13-0.18	5.1-7.3	Low----------	0.24	5	3	.5-1
	8-24	3-15	1.60-1.75	0.6-2.0	0.09-0.22	5.1-7.3	Low----------	0.17			
	24-38	8-15	1.55-1.65	0.6-2.0	0.12-0.20	5.1-7.3	Low----------	0.24			
	38-60	1-12	1.50-1.70	0.6-2.0	0.05-0.22	5.1-7.3	Low----------	0.24			
AfC------------- Alban	0-8	3-8	1.35-1.65	0.6-2.0	0.13-0.18	5.1-7.3	Low----------	0.24	5	3	.5-2
	8-24	3-15	1.60-1.75	0.6-2.0	0.09-0.22	5.1-7.3	Low----------	0.17			
	24-38	8-18	1.55-1.65	0.6-2.0	0.12-0.20	5.1-7.3	Low----------	0.24			
	38-60	1-12	1.50-1.70	0.6-2.0	0.05-0.22	5.1-7.3	Low----------	0.24			
AgB------------- Almena	0-9	14-23	1.20-1.55	0.6-2.0	0.22-0.24	4.5-7.3	Low----------	0.37	5	5	2-4
	9-24	8-24	1.30-1.60	0.6-2.0	0.20-0.24	4.5-6.0	Low----------	0.37			
	24-42	18-30	1.50-1.65	0.2-2.0	0.18-0.22	4.5-5.5	Moderate-----	0.37			
	42-48	18-25	1.50-1.65	0.2-2.0	0.20-0.22	4.5-6.0	Low----------	0.37			
	48-60	10-20	1.75-1.90	0.2-0.6	0.07-0.16	5.1-6.0	Low----------	0.20			
AlB------------- Amery	0-2	4-12	1.25-1.80	0.6-2.0	0.10-0.18	4.5-7.3	Low----------	0.24	5	3	1-3
	2-32	6-18	1.70-1.85	0.2-0.6	0.04-0.12	4.5-7.3	Low----------	0.24			
	32-60	4-18	1.80-1.90	0.2-0.6	0.02-0.08	5.1-6.5	Low----------	0.17			
AlC, AlD, AlF---- Amery	0-2	4-12	1.25-1.80	0.6-2.0	0.10-0.18	4.5-7.3	Low----------	0.24	5	3	1-3
	2-32	6-18	1.70-1.80	0.6-2.0	0.04-0.18	4.5-7.3	Low----------	0.24			
	32-60	4-18	1.65-1.80	0.6-2.0	0.04-0.15	5.1-6.5	Low----------	0.17			
AnB, AnC2-------- Antigo	0-10	8-15	1.25-1.55	0.6-2.0	0.20-0.24	4.5-6.5	Low----------	0.37	4	5	1-3
	10-28	18-24	1.55-1.65	0.6-2.0	0.16-0.22	4.5-6.5	Low----------	0.37			
	28-32	2-22	1.55-1.80	0.6-2.0	0.05-0.19	4.5-6.5	Low----------	0.24			
	32-60	1-6	1.50-1.80	>6.0	0.02-0.06	5.1-6.5	Low----------	0.10			
AoA------------- Arenzville	0-8	10-18	1.20-1.55	0.6-2.0	0.20-0.24	5.6-7.8	Low----------	0.37	5	5	1-3
	8-50	10-30	1.25-1.45	0.6-2.0	0.18-0.22	5.6-7.8	Moderate-----	0.37			
	50-60	10-20	1.20-1.40	0.6-2.0	0.20-0.22	5.6-7.8	Low----------	0.37			
ApB, ApC2, ApD2-- Arland	0-7	6-12	1.20-1.70	0.6-2.0	0.10-0.18	4.5-6.5	Low----------	0.24	4	3	1-3
	7-25	10-18	1.55-1.65	0.6-2.0	0.13-0.19	4.5-6.5	Low----------	0.24			
	25-29	5-12	1.40-1.70	0.6-6.0	0.08-0.17	4.5-6.5	Low----------	0.24			
	29-35	2-7	1.55-1.70	2.0-6.0	0.04-0.11	5.1-6.5	Low----------	0.15			
	35	---	---	---	---	---	-------------	----			
AsB, AsC2, AsD2-- Arland	0-7	10-15	1.20-1.55	0.6-2.0	0.14-0.24	4.5-6.5	Low----------	0.32	4	5	1-3
	7-25	10-18	1.55-1.65	0.6-2.0	0.13-0.19	4.5-6.5	Low----------	0.24			
	25-29	5-12	1.40-1.70	0.6-6.0	0.08-0.17	4.5-6.5	Low----------	0.24			
	29-35	2-7	1.55-1.70	2.0-6.0	0.04-0.11	5.1-6.5	Low----------	0.15			
	35	---	---	---	---	---	-------------	----			
Au-------------- Auburndale	0-6	6-25	1.35-1.55	0.6-2.0	0.22-0.24	4.5-6.0	Low----------	0.37	5	5	4-1
	6-38	18-22	1.50-1.65	0.2-2.0	0.20-0.22	4.5-6.0	Moderate-----	0.37			
	38-45	8-20	1.50-1.70	0.2-2.0	0.08-0.22	4.5-6.0	Low----------	0.37			
	45-60	5-15	1.75-1.85	0.6-2.0	0.08-0.19	5.1-6.5	Low----------	0.28			
Ba-------------- Barronett	0-9	5-15	1.25-1.45	0.6-2.0	0.22-0.35	4.5-7.3	Low----------	0.28	5	5	3-7
	9-18	4-15	1.45-1.50	0.2-2.0	0.20-0.26	4.5-6.0	Low----------	0.28			
	18-40	18-25	1.35-1.55	0.2-2.0	0.18-0.22	4.5-6.0	Low----------	0.28			
	40-60	10-18	1.35-1.55	0.2-2.0	0.17-0.22	4.5-7.8	Low----------	0.28			
Bb-------------- Barronett	0-8	5-15	1.25-1.45	0.6-2.0	0.22-0.35	4.5-7.3	Low----------	0.28	5	5	4-
	8-30	18-25	1.35-1.55	0.2-2.0	0.18-0.22	4.5-6.0	Low----------	0.28			
	30-60	10-18	1.35-1.55	0.2-2.0	0.17-0.22	4.5-7.8	Low----------	0.28			

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
So----------------- Shiffer	0-9	Loam--------------	CL, CL-ML	A-4, A-6	0	95-100	95-100	80-95	55-75	20-35	6-15
	9-27	Loam, sandy clay loam, clay loam.	CL, SC	A-6, A-4, A-2	0	95-100	95-100	75-95	30-80	25-35	7-15
	27-31	Sandy loam, loamy sand.	SM, SM-SC	A-2, A-4, A-1	0	95-100	95-100	45-75	12-40	17-27	1-7
	31-60	Sand, coarse sand, loamy sand.	SM, SP-SM, SP	A-2, A-3, A-1	0	95-100	95-100	45-95	3-30	---	NP
SrB, SrC2-------- Spencer	0-9	Silt loam--------	ML, CL, CL-ML	A-4	0	100	100	90-100	85-100	20-30	3-10
	9-42	Silt loam--------	CL, ML, CL-ML	A-6, A-4	0	100	100	90-100	85-100	25-40	4-19
	42-60	Sandy loam, loam, gravelly sandy loam.	SM, SC, ML, CL	A-2, A-4, A-1, A-6	0-4	60-100	55-90	30-85	15-65	<30	NP-15
SsA, SsB--------- Spencer	0-8	Silt loam--------	ML, CL, CL-ML	A-4	0	100	100	90-100	85-100	20-30	3-10
	8-50	Silt loam--------	CL, CL-ML, ML	A-4, A-6	0	100	100	90-100	85-100	25-40	4-19
	50-60	Sand and gravel, sand.	SP, SP-SM, GP, GP-GM	A-2, A-3, A-1	0-6	45-90	40-85	25-55	2-10	---	NP
TeB-------------- Tell	0-9	Silt loam--------	CL	A-4	0	100	100	90-100	85-95	25-30	7-10
	9-30	Silty clay loam, silt loam.	CL	A-6	0	100	100	90-100	85-95	30-40	10-16
	30-35	Loam, sandy loam, sandy clay loam.	CL, CL-ML, SC, SM-SC	A-4, A-6, A-2	0	100	90-100	55-95	25-75	20-35	4-14
	35-60	Sand, loamy sand	SM, SP-SM, SP	A-2, A-3, A-1	0	100	90-100	45-75	0-30	---	NP
Ud. Udifluvents											
Ve--------------- Vesper	0-12	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	100	85-100	60-100	20-30	4-11
	12-38	Loam, clay loam	SC, CL	A-4, A-6, A-7	0	100	100	80-100	40-100	20-44	7-24
	38-60	Stratified sand to clay.	SM, SC, ML, CL	A-2, A-4, A-6, A-7	0	90-100	90-100	70-95	10-75	<50	NP-31
Wb--------------- Warman Variant	0-8	Sandy loam-------	SM, SM, SM-SC	A-2, A-4	0	95-100	95-100	60-70	25-40	<23	1-6
	8-24	Sandy loam, loamy sand.	SM, SM-SC	A-1, A-2	0	80-100	75-90	35-70	12-35	<23	NP-6
	24-60	Sand and gravel	SP, SW, GP, GP-GM	A-1	0	50-75	45-75	20-35	1-5	---	NP
WeB-------------- Withee	0-8	Silt loam--------	CL, CL-ML	A-4	0-15	100	100	90-100	85-100	20-30	5-10
	8-23	Silt loam--------	CL, CL-ML	A-4, A-6	0-15	100	100	90-100	85-100	20-35	5-15
	23-42	Loam, clay loam, sandy clay loam.	CL, SC	A-6, A-7, A-2	0-15	75-100	75-100	60-100	25-80	25-45	10-25
	42-60	Loam, fine sandy loam, sandy clay loam.	CL, SC	A-6, A-7, A-2, A-4	0-15	75-100	75-100	50-100	30-80	20-45	7-25

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibilit group
								K	T	
	In	Pct	g/cc	In/hr	In/in	pH				
Be----------------	0-20	---	0.10-0.25	2.0-6.0	0.55-0.65	3.6-4.4	-------------	----	2	3
Beseman	20-60	10-28	1.55-1.95	0.2-0.6	0.11-0.18	3.6-7.3	Moderate-----	----		
BlA, BlB, BlC2---	0-9	5-15	1.40-1.70	2.0-6.0	0.13-0.18	4.5-7.8	Low----------	0.20	4	3
Billett	9-30	6-18	1.40-1.70	2.0-6.0	0.10-0.17	4.5-7.3	Low----------	0.20		
	30-36	3-18	1.50-1.80	2.0-6.0	0.07-0.14	4.5-7.3	Low----------	0.20		
	36-60	1-10	1.60-1.90	6.0-20	0.03-0.10	5.1-7.8	Low----------	0.10		
BmA---------------	0-8	5-15	1.40-1.70	2.0-6.0	0.13-0.18	4.5-7.8	Low----------	0.20	4	3
Billett	8-37	6-18	1.40-1.70	2.0-6.0	0.10-0.17	4.5-7.3	Low----------	0.20		
	37-60	1-10	1.60-1.90	6.0-20	0.03-0.10	5.1-7.8	Low----------	0.10		
BoE---------------	0-2	2-3	1.55-1.65	6.0-20	0.07-0.10	4.5-6.5	Low----------	0.15	4	1
Boone	2-22	0-3	1.55-1.70	6.0-20	0.04-0.11	4.5-7.3	Low----------	0.15		
	22	---	---	---	---	---	-------------	----		
BpA---------------	0-8	8-15	1.25-1.35	0.6-2.0	0.22-0.28	4.5-6.5	Low----------	0.37	4	5
Brill	8-13	8-13	1.40-1.50	0.6-2.0	0.20-0.26	4.5-6.5	Low----------	0.37		
	13-25	18-30	1.45-1.55	0.6-2.0	0.18-0.22	4.5-6.5	Moderate-----	0.37		
	25-34	2-15	1.45-1.75	0.6-6.0	0.10-0.22	4.5-6.5	Low----------	0.37		
	34-60	1-6	1.75-2.00	>6.0	0.02-0.04	5.1-7.3	Low----------	0.10		
BuA---------------	0-11	5-13	1.35-1.55	2.0-6.0	0.11-0.15	5.1-6.5	Low----------	0.20	3	3
Burkhardt	11-17	8-18	1.55-1.65	2.0-6.0	0.10-0.19	5.1-7.3	Low----------	0.24		
	17-60	1-6	1.50-1.80	>6.0	0.02-0.04	5.6-6.5	Low----------	0.10		
Cb----------------	0-4	12-16	1.10-1.35	0.2-2.0	0.15-0.24	4.5-7.3	Low----------	0.37	5	5
Cable	4-16	8-18	1.35-1.45	0.2-2.0	0.10-0.22	4.5-7.3	Low----------	0.37		
	16-26	8-16	1.40-1.90	0.2-2.0	0.03-0.18	4.5-7.3	Low----------	0.37		
	26-60	5-10	1.70-1.90	0.2-0.6	0.03-0.13	5.1-7.8	Low----------	0.28		
CdB, CdC2, CdD2--	0-8	8-22	1.35-1.65	0.6-2.0	0.22-0.27	4.5-7.3	Low----------	0.37	5	5
Campia	8-42	18-30	1.50-1.60	0.6-2.0	0.18-0.22	4.5-6.0	Low----------	0.37		
	42-60	8-27	1.45-1.55	0.6-2.0	0.20-0.22	5.1-7.8	Low----------	0.37		
CeA---------------	0-16	5-15	1.35-1.55	2.0-6.0	0.12-0.18	5.6-7.3	Low----------	0.20	5	3
Caryville	16-60	2-10	1.55-1.70	2.0-20	0.04-0.10	5.1-7.3	Low----------	0.20		
CkA, CkB, CkC2---	0-8	4-12	1.35-1.70	2.0-6.0	0.10-0.15	5.1-6.5	Low----------	0.24	3	3
Chetek	8-17	10-18	1.65-1.75	2.0-6.0	0.09-0.19	5.1-6.5	Low----------	0.24		
	17-60	1-6	1.50-1.60	>6.0	0.02-0.04	5.1-6.5	Low----------	0.10		
CkD2*, CkE*:										
Chetek-----------	0-8	4-12	1.35-1.70	2.0-6.0	0.10-0.15	5.1-6.5	Low----------	0.24	3	3
	8-17	10-18	1.65-1.75	2.0-6.0	0.09-0.19	5.1-6.5	Low----------	0.24		
	17-60	1-6	1.50-1.60	>6.0	0.02-0.04	5.1-6.5	Low----------	0.10		
Mahtomedi--------	0-8	2-15	1.40-1.60	6.0-20	0.10-0.12	5.1-6.5	Low----------	0.15	5	3
	8-24	0-10	1.45-1.70	6.0-20	0.05-0.07	5.1-6.5	Low----------	0.10		
	24-60	0-10	1.45-1.75	6.0-20	0.04-0.09	5.1-7.8	Low----------	0.10		
Cm----------------	0-8	8-22	1.35-1.65	0.6-2.0	0.20-0.24	5.1-7.3	Low----------	0.37	5	5
Comstock	8-48	18-30	1.50-1.60	0.6-2.0	0.18-0.22	4.5-6.0	Moderate-----	0.37		
	48-60	8-20	1.45-1.55	0.2-0.6	0.12-0.22	5.1-7.3	Low----------	0.37		
CuA---------------	0-8	8-20	1.35-1.55	0.6-2.0	0.20-0.24	4.5-6.5	Low----------	0.37	5	5
Crystal Lake	8-44	18-30	1.50-1.60	0.6-2.0	0.18-0.22	4.5-6.0	Moderate-----	0.37		
	44-60	8-20	1.45-1.55	0.2-0.6	0.20-0.22	4.5-7.3	Low----------	0.37		

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	g/cc	In/hr	In/in	pH					Pct
ElB, ElC2, ElD2--	0-9	5-15	1.40-1.60	2.0-6.0	0.10-0.18	3.6-7.3	Low----------	0.24	4	3	1-3
Eleva	9-36	10-18	1.50-1.60	0.6-6.0	0.09-0.19	3.6-6.5	Low----------	0.24			
	36-40	1-8	1.50-1.70	2.0-20	0.04-0.10	3.6-6.5	Low----------	0.15			
	40	---	---	---	---	---	--------------	----			
EmB, EmC2, EmD2, EmE-------------	0-7	5-12	1.20-1.55	0.6-6.0	0.15-0.22	4.5-7.3	Low----------	0.32	2	5	1-2
Elkmound	7-16	10-20	1.55-1.65	0.6-6.0	0.09-0.20	4.5-6.5	Low----------	0.24			
	16-19	2-6	1.55-1.70	2.0-6.0	0.06-0.11	4.5-6.5	Low----------	0.17			
	19	---	---	---	---	---	--------------	----			
Eo---------------	0-4	3-8	1.35-1.65	2.0-6.0	0.10-0.13	3.6-6.0	Low----------	0.17	4	2	1-2
Elm Lake	4-23	2-8	1.55-1.70	6.0-20	0.06-0.12	3.6-6.0	Low----------	0.15			
	23-48	27-45	1.50-1.75	<0.06	0.09-0.19	3.6-6.0	Moderate-----	0.43			
	48	---	---	---	---	---	--------------	----			
FaB---------------	0-8	4-12	1.35-1.65	0.6-2.0	0.12-0.15	4.5-6.5	Low----------	0.24	5	3	1-3
Fallcreek	8-40	9-18	1.55-1.65	0.2-0.6	0.10-0.19	3.6-6.5	Low----------	0.24			
	40-60	10-25	1.55-1.85	0.2-0.6	0.09-0.19	4.5-6.5	Low----------	0.24			
FbB, FbC2--------	0-8	8-14	1.35-1.55	0.6-2.0	0.17-0.24	5.6-7.3	Low----------	0.32	5	5	2-3
Flambeau	8-17	5-14	1.35-1.70	0.6-2.0	0.10-0.22	4.5-7.3	Low----------	0.32			
	17-36	18-30	1.55-1.65	0.6-2.0	0.12-0.19	4.5-6.5	Low----------	0.32			
	36-60	6-20	1.65-1.75	0.2-0.6	0.13-0.19	4.5-6.5	Low----------	0.32			
Fm---------------	0-9	10-23	1.35-1.45	0.6-2.0	0.17-0.24	4.5-8.4	Low----------	0.24	4	8	4-12
Fordum	9-21	8-18	1.40-1.50	0.6-6.0	0.10-0.19	4.5-8.4	Low----------	0.32			
	21-60	2-5	1.55-1.70	>6.0	0.04-0.13	4.5-8.4	Low----------	0.15			
FnB, FnC2--------	0-8	5-18	1.25-1.55	0.6-2.0	0.20-0.24	4.5-7.3	Low----------	0.37	5	5	1-3
Freeon	8-23	5-18	1.35-1.65	0.6-2.0	0.18-0.22	4.5-6.5	Low----------	0.37			
	23-38	5-18	1.70-1.80	0.2-2.0	0.08-0.18	4.5-6.5	Low----------	0.37			
	38-60	3-27	1.80-1.95	0.06-0.6	0.02-0.06	5.1-7.8	Low----------	0.28			
FrA--------------	0-8	3-8	1.50-1.65	6.0-20	0.08-0.12	5.1-6.5	Low----------	0.17	5	2	.5-2
Friendship	8-36	2-7	1.35-1.65	6.0-20	0.05-0.11	5.1-6.5	Low----------	0.15			
	36-60	0-4	1.50-1.70	6.0-20	0.04-0.07	5.6-7.8	Low----------	0.15			
GaB, GaC2, GaD2--	0-8	12-20	1.35-1.45	0.6-2.0	0.22-0.24	4.5-7.3	Low----------	0.37	4	5	1-3
Gale	8-30	20-32	1.45-1.55	0.6-2.0	0.18-0.22	4.5-6.5	Moderate-----	0.37			
	30-36	1-14	1.30-1.50	6.0-20	0.05-0.14	4.5-6.5	Low----------	0.15			
	36	---	---	---	---	---	--------------	----			
Gr---------------	0-4	---	0.30-0.40	>6.0	0.55-0.65	3.6-4.4	--------------	----	2	5	55-75
Greenwood	4-60	---	0.10-0.25	2.0-6.0	0.45-0.55	3.6-4.4	--------------	----			
Ha---------------	0-8	7-15	1.35-1.55	0.6-2.0	0.17-0.24	4.5-7.3	Low----------	0.32	4	5	2-4
Halder	8-28	6-18	1.65-1.75	0.6-2.0	0.13-0.22	4.5-6.5	Low----------	0.32			
	28-32	5-15	1.55-1.70	0.6-6.0	0.05-0.13	4.5-6.5	Low----------	0.24			
	32-60	1-5	1.55-1.80	>6.0	0.02-0.04	5.6-6.5	Low----------	0.10			
HeB--------------	0-8	10-20	1.35-1.55	0.6-2.0	0.22-0.24	4.5-7.3	Low----------	0.37	4	5	1-3
Hiles	8-22	10-20	1.55-1.65	0.6-2.0	0.18-0.22	4.5-6.5	Low----------	0.37			
	22-26	20-35	1.55-1.65	0.6-2.0	0.18-0.22	4.5-6.0	Moderate-----	0.37			
	26-30	20-35	1.55-1.65	0.6-2.0	0.13-0.18	3.6-5.5	Moderate-----	0.37			
	30	---	---	---	---	---	--------------	----			
HfB--------------	0-14	11-19	1.35-1.55	0.6-2.0	0.20-0.22	4.5-5.5	Low----------	0.32	3	5	2-3
Hiles Variant	14-40	35-54	1.35-1.70	<0.06	0.08-0.11	3.6-5.5	High---------	0.32			
	40-48	18-40	1.45-1.70	0.6-2.0	0.11-0.18	4.5-5.5	Moderate-----	0.32			
	48	---	---	---	---	---	--------------	----			

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodi-bility group	Organic matter
								K	T		
	In	Pct	g/cc	In/hr	In/in	pH					Pct
HnB, HnC2 Hixton	0-7	12-16	1.35-1.55	0.6-2.0	0.20-0.22	5.1-6.5	Low	0.32	4	5	1-2
	7-24	18-27	1.55-1.65	0.6-2.0	0.12-0.19	5.1-6.5	Low	0.32			
	24-34	2-6	1.55-1.70	6.0-20	0.05-0.10	5.1-6.5	Low	0.15			
	34	---	---	---	---	---	---	----			
HuB, HuC2 Humbird	0-8	6-13	1.35-1.70	0.6-2.0	0.12-0.18	4.5-7.3	Low	0.24	3	3	1-2
	8-25	10-18	1.40-1.70	2.0-6.0	0.06-0.14	3.6-6.5	Low	0.15			
	25-36	35-60	1.50-1.75	0.06-0.2	0.08-0.13	3.6-5.5	High	0.32			
	36	---	---	---	---	---	---	----			
KeB Kert	0-8	10-20	1.40-1.55	0.6-2.0	0.20-0.24	5.1-7.3	Low	0.37	3	5	2-4
	8-22	6-18	1.60-1.70	0.6-6.0	0.09-0.22	3.6-5.5	Low	0.37			
	22-28	20-35	1.60-1.70	0.06-0.2	0.12-0.20	3.6-5.5	Moderate	0.37			
	28-60	15-45	1.60-1.70	0.06-0.2	0.12-0.19	3.6-5.5	Moderate	0.37			
La Lows	0-9	12-22	1.20-1.55	0.6-2.0	0.20-0.22	5.1-6.5	Low	0.24	4	5	3-5
	9-16	10-22	1.20-1.55	0.6-2.0	0.12-0.19	5.1-6.5	Low	0.24			
	16-39	18-27	1.55-1.65	0.6-2.0	0.16-0.19	5.1-6.5	Moderate	0.32			
	39-60	2-8	1.75-1.85	6.0-20	0.05-0.11	5.1-6.5	Low	0.15			
LoB, LoC2 Loyal	0-8	10-14	1.35-1.55	0.6-2.0	0.22-0.24	4.5-7.3	Low	0.37	5	5	1-3
	8-16	10-16	1.55-1.65	0.6-2.0	0.20-0.22	4.5-5.5	Low	0.37			
	16-22	12-25	1.55-1.65	0.6-2.0	0.20-0.22	4.5-5.5	Low	0.37			
	22-44	18-25	1.80-1.90	0.6-2.0	0.15-0.19	4.5-5.5	Low	0.37			
	44-60	15-22	1.80-1.90	0.6-2.0	0.11-0.19	4.5-5.5	Low	0.37			
Lp Lupton	0-60	---	0.10-0.35	2.0-6.0	0.35-0.45	5.6-7.8	---	----	2	2	70-90
MbB Magnor	0-8	5-18	1.35-1.55	0.6-2.0	0.18-0.24	4.5-6.5	Low	0.37	5	5	1-3
	8-18	5-18	1.60-1.70	0.6-2.0	0.17-0.22	4.5-6.5	Low	0.37			
	18-32	3-12	1.40-1.70	0.2-2.0	0.08-0.18	4.5-6.0	Low	0.37			
	32-60	3-12	1.80-1.95	0.2-0.6	0.02-0.06	4.5-6.5	Low	0.24			
McB Magnor	0-4	5-18	1.35-1.55	0.6-2.0	0.12-0.21	4.5-6.5	Low	0.28	5	8	3-7
	4-18	5-18	1.60-1.70	0.6-2.0	0.17-0.22	4.5-6.5	Low	0.37			
	18-32	3-12	1.40-1.70	0.2-2.0	0.08-0.18	4.5-6.0	Low	0.37			
	32-60	3-12	1.80-1.95	0.2-0.6	0.07-0.18	4.5-6.5	Low	0.24			
MdB, MdC Mahtomedi	0-8	2-15	1.40-1.60	6.0-20	0.10-0.12	5.1-7.3	Low	0.15	5	[illegible]	<1
	8-24	0-10	1.45-1.70	6.0-20	0.05-0.07	5.1-6.5	Low	0.10			
	24-60	0-10	1.45-1.75	6.0-20	0.04-0.09	5.1-7.8	Low	0.10			
Me Markey	0-36	---	0.15-0.45	2.0-6.0	0.35-0.45	4.5-7.8	---	----	2	[illegible]	55-85
	36-60	0-10	1.40-1.65	6.0-20	0.03-0.08	4.5-8.4	Low	----			
Mh Meehan	0-8	4-10	1.35-1.65	6.0-20	0.10-0.12	3.6-6.0	Low	0.17	5	[illegible]	.5-3
	8-30	4-9	1.60-1.70	6.0-20	0.06-0.11	5.1-6.5	Low	0.17			
	30-60	1-4	1.60-1.70	6.0-20	0.02-0.07	5.1-6.5	Low	0.17			
MkB, MkC Menahga	0-8	2-10	1.20-1.50	6.0-20	0.10-0.12	4.5-6.5	Low	0.15	5	[illegible]	.5-2
	8-40	0-5	1.50-1.65	6.0-20	0.05-0.07	4.5-6.5	Low	0.15			
	40-60	0-5	1.50-1.65	6.0-20	0.05-0.07	4.5-7.3	Low	0.15			
MlA, MlB Meridian	0-9	8-20	1.35-1.55	0.6-2.0	0.20-0.22	6.1-7.8	Low	0.32	4	[illegible]	2-3
	9-37	18-22	1.55-1.65	0.6-2.0	0.16-0.19	5.1-6.5	Low	0.32			
	37-60	1-6	1.75-1.85	6.0-20	0.05-0.10	5.1-6.5	Low	0.15			

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	g/cc	In/hr	In/in	pH					Pct
MmA	0-9	8-20	1.35-1.55	0.6-2.0	0.20-0.22	6.1-7.8	Low	0.32	4	5	2-3
Meridian	9-26	18-22	1.55-1.65	0.6-2.0	0.16-0.19	5.1-6.5	Low	0.32			
	26-32	3-15	1.55-1.65	0.6-6.0	0.09-0.14	5.1-6.5	Low	0.24			
	32-60	1-6	1.75-1.85	6.0-20	0.05-0.10	5.1-6.5	Low	0.15			
MrB	0-7	6-13	1.35-1.70	0.6-2.0	0.13-0.15	4.5-7.3	Low	0.24	3	3	1-2
Merrillan	7-19	10-18	1.40-1.70	0.6-2.0	0.06-0.14	4.5-6.5	Low	0.24			
	19-48	30-60	1.50-1.75	0.06-0.2	0.13-0.20	3.6-5.5	Moderate	0.32			
	48	---	---	---	---	---	---	----			
Mu	0-9	8-12	1.20-1.55	0.6-2.0	0.19-0.24	4.5-7.8	Low	0.37	4	5	4-10
Minocqua	9-38	10-18	1.50-1.60	0.6-2.0	0.11-0.19	4.5-7.8	Low	0.37			
	38-60	0-3	1.75-1.85	>6.0	0.02-0.04	4.5-7.8	Low	0.10			
MvA	0-9	2-4	1.35-1.55	6.0-20	0.10-0.12	5.1-6.5	Low	0.17	5	2	.5-2
Moundville	9-24	5-8	1.40-1.60	6.0-20	0.09-0.11	5.1-6.5	Low	0.17			
	24-60	1-3	1.50-1.70	6.0-20	0.06-0.11	5.1-7.3	Low	0.17			
Na	0-9	4-12	1.35-1.65	2.0-6.0	0.08-0.13	3.6-6.0	Low	0.17	5	2	4-15
Newson	9-44	1-4	1.70-1.80	6.0-20	0.05-0.11	3.6-5.5	Low	0.17			
	44-60	1-4	1.70-1.80	6.0-20	0.04-0.11	4.5-6.5	Low	0.17			
NtB, NtC2, NtD2	0-8	10-20	1.35-1.55	0.6-2.0	0.17-0.24	5.6-7.3	Low	0.32	2	5	1-2
Northfield	8-18	15-27	1.55-1.65	0.6-2.0	0.14-0.22	4.5-6.5	Low	0.32			
	18	---	---	---	---	---	---	----			
Oe	0-7	8-15	1.40-1.70	0.6-2.0	0.10-0.15	4.5-6.5	Low	0.24	4	3	2-3
Oesterle	7-25	10-18	1.55-1.65	0.6-2.0	0.09-0.19	4.5-6.5	Low	0.24			
	25-34	6-12	1.55-1.70	0.6-6.0	0.05-0.13	4.5-6.5	Low	0.24			
	34-60	1-6	1.55-1.70	>6.0	0.02-0.09	5.1-6.5	Low	0.10			
Or	0-7	10-18	1.20-1.30	0.6-2.0	0.22-0.24	5.1-7.8	Low	0.37	5	5	1-3
Orion	7-32	10-18	1.20-1.30	0.6-2.0	0.20-0.22	5.1-7.8	Low	0.37			
	32-51	10-30	1.25-1.45	0.6-2.0	0.18-0.22	5.1-7.8	Low	0.37			
	51-60	10-18	1.20-1.40	0.6-2.0	0.18-0.22	5.1-7.8	Low	0.37			
OsC2	0-8	9-19	1.40-1.55	0.6-2.0	0.22-0.24	5.1-7.3	Low	0.37	5	5	2-4
Otterholt	8-43	18-25	1.50-1.65	0.6-2.0	0.20-0.22	4.5-6.5	Moderate	0.37			
	43-60	10-20	1.75-1.90	0.2-0.6	0.08-0.18	4.5-6.5	Low	0.28			
Pc*.											
Pits											
PdB, PdC, PdD	0-6	5-15	1.35-1.65	2.0-6.0	0.10-0.13	3.6-6.5	Low	0.17	4	2	<1
Plainbo	6-28	1-10	1.50-1.65	6.0-20	0.06-0.11	3.6-6.5	Low	0.10			
	28	---	---	---	---	---	---	----			
Pv	0-14	5-12	1.35-1.65	0.6-2.0	0.20-0.24	4.5-7.3	Low	0.37	5	5	2-4
Plover	14-38	5-18	1.40-1.70	0.6-2.0	0.15-0.19	4.5-7.3	Low	0.24			
	38-60	1-12	1.50-1.70	0.6-2.0	0.11-0.22	5.6-7.3	Low	0.24			
Px	0-10	13-17	1.35-1.55	0.6-2.0	0.21-0.24	4.5-6.5	Low	0.37	4	5	1-3
Poskin	10-29	18-25	1.55-1.65	0.6-2.0	0.17-0.22	4.5-6.5	Low	0.37			
	29-38	2-15	1.40-1.65	0.6-6.0	0.05-0.22	4.5-6.5	Low	0.24			
	38-60	0-3	1.75-1.85	>6.0	0.02-0.07	5.1-7.3	Low	0.10			

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	g/cc	In/hr	In/in	pH					Pct
Rb--------------- Rib	0-8	10-20	1.25-1.35	0.6-2.0	0.22-0.28	5.1-7.3	Low-----------	0.32	4	5	3-10
	8-12	15-20	1.40-1.50	0.6-2.0	0.20-0.26	5.1-7.3	Low-----------	0.32			
	12-28	18-30	1.45-1.55	0.6-2.0	0.18-0.22	5.1-7.3	Moderate------	0.32			
	28-33	5-25	1.45-1.75	0.6-2.0	0.10-0.19	5.1-7.3	Low-----------	0.32			
	33-60	1-6	1.75-1.85	>20	0.02-0.06	5.6-7.8	Low-----------	0.10			
Rc--------------- Rib	0-15	10-20	1.25-1.35	0.6-2.0	0.22-0.28	5.1-7.3	Low-----------	0.32	4	5	4-16
	15-44	18-30	1.45-1.55	0.6-2.0	0.18-0.22	5.1-7.3	Moderate------	0.32			
	44-60	1-6	1.75-1.85	>20	0.02-0.06	5.6-7.8	Low-----------	0.10			
RfA-------------- Richford	0-8	4-10	1.35-1.65	2.0-6.0	0.09-0.13	5.6-7.3	Low-----------	0.17	5	2	<1
	8-22	2-12	1.50-1.70	2.0-20	0.05-0.11	5.6-7.3	Low-----------	0.17			
	22-30	6-12	1.55-1.70	2.0-6.0	0.10-0.17	5.1-7.3	Low-----------	0.17			
	30-36	2-12	1.55-1.70	6.0-20	0.07-0.10	5.1-7.3	Low-----------	0.17			
	36-60	1-5	1.65-1.80	6.0-20	0.03-0.07	6.1-7.3	Low-----------	0.17			
RoA, RoB, RoC2--- Rosholt	0-8	4-10	1.50-1.60	0.6-6.0	0.10-0.18	4.5-7.3	Low-----------	0.24	4	3	1-3
	8-20	3-12	1.70-1.80	0.6-6.0	0.10-0.22	4.5-7.3	Low-----------	0.24			
	20-28	6-15	1.65-1.75	0.6-6.0	0.09-0.19	4.5-7.3	Low-----------	0.24			
	28-34	4-15	1.55-1.65	0.6-6.0	0.04-0.16	4.5-7.3	Low-----------	0.10			
	34-60	0-5	1.50-1.80	>6.0	0.02-0.04	5.1-6.5	Low-----------	0.10			
RpA, RpB, RpC2--- Rosholt	0-8	7-13	1.50-1.60	0.6-6.0	0.16-0.24	4.5-7.3	Low-----------	0.32	4	5	1-3
	8-15	3-12	1.70-1.80	0.6-6.0	0.10-0.22	4.5-7.3	Low-----------	0.24			
	15-28	6-15	1.65-1.75	0.6-6.0	0.09-0.19	4.5-7.3	Low-----------	0.24			
	28-34	4-15	1.55-1.65	0.6-6.0	0.04-0.16	4.5-7.3	Low-----------	0.10			
	34-60	0-5	1.50-1.80	>6.0	0.02-0.04	5.1-6.5	Low-----------	0.10			
SaB, SaC2, SaD2-- Santiago	0-7	5-15	1.20-1.55	0.6-2.0	0.20-0.24	4.5-7.3	Low-----------	0.37	5	5	2-4
	7-13	5-14	1.40-1.50	0.6-2.0	0.20-0.23	4.5-6.5	Low-----------	0.37			
	13-19	15-30	1.45-1.65	0.6-2.0	0.17-0.22	4.5-6.5	Moderate------	0.37			
	19-30	18-25	1.65-1.75	0.6-2.0	0.09-0.18	4.5-6.5	Low-----------	0.28			
	30-60	3-15	1.65-1.75	0.6-2.0	0.08-0.18	5.1-7.3	Low-----------	0.28			
SbA-------------- Sattre	0-9	18-24	1.40-1.45	0.6-2.0	0.18-0.20	6.1-6.5	Low-----------	0.28	4	6	2-3
	9-30	18-28	1.40-1.50	0.6-6.0	0.15-0.17	5.1-5.5	Low-----------	0.28			
	30-60	2-8	1.50-1.75	>20	0.02-0.06	5.1-6.0	Low-----------	0.15			
ScB-------------- Scott Lake	0-8	6-15	1.35-1.50	0.6-6.0	0.10-0.22	4.5-6.5	Low-----------	0.24	4	3	1-3
	8-36	8-18	1.55-1.70	0.6-6.0	0.09-0.19	4.5-6.5	Low-----------	0.32			
	36-60	1-6	1.55-1.80	>6.0	0.01-0.07	4.5-7.3	Low-----------	0.10			
SdA-------------- Scott Lake	0-8	10-15	1.35-1.50	0.6-2.0	0.16-0.24	4.5-6.5	Low-----------	0.32	4	5	2-3
	8-26	8-18	1.55-1.70	0.6-6.0	0.09-0.19	4.5-6.5	Low-----------	0.32			
	26-36	5-12	1.55-1.80	0.6-6.0	0.05-0.13	4.5-6.5	Low-----------	0.24			
	36-60	1-6	1.55-1.80	>6.0	0.01-0.07	4.5-7.3	Low-----------	0.10			
SeB-------------- Seaton	0-7	15-22	1.10-1.20	0.6-2.0	0.22-0.24	5.6-7.3	Low-----------	0.37	5	6	1-3
	7-42	18-27	1.15-1.30	0.6-2.0	0.20-0.22	5.1-7.3	Low-----------	0.37			
	42-60	15-25	1.20-1.40	0.6-2.0	0.20-0.22	5.6-8.4	Low-----------	0.37			
SeC2, SeD2------- Seaton	0-7	15-22	1.10-1.20	0.6-2.0	0.22-0.24	5.6-7.3	Low-----------	0.37	5-4	6	1-3
	7-42	18-27	1.15-1.30	0.6-2.0	0.20-0.22	5.1-7.3	Low-----------	0.37			
	42-60	15-25	1.20-1.40	0.6-2.0	0.20-0.22	5.6-8.4	Low-----------	0.37			
SfA-------------- Seaton	0-9	10-14	1.35-1.55	0.6-2.0	0.22-0.24	6.1-6.5	Low-----------	0.37	5	5	2-3
	9-42	15-24	1.55-1.65	0.6-2.0	0.20-0.22	5.1-6.0	Low-----------	0.37			
	42-60	10-14	1.45-1.70	0.6-2.0	0.20-0.22	5.1-5.5	Low-----------	0.37			

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	g/cc	In/hr	In/in	pH					Pct
SgA, SgB----------	0-8	10-14	1.35-1.55	0.6-2.0	0.22-0.24	5.6-7.3	Low-----------	0.37	5	5	2-3
Seaton	8-38	15-25	1.55-1.65	0.6-2.0	0.20-0.22	5.1-6.5	Low-----------	0.37			
	38-48	10-14	1.45-1.70	0.6-2.0	0.20-0.22	5.6-8.4	Low-----------	0.37			
	48-60	1-6	1.55-1.70	6.0-20	0.05-0.07	5.6-6.0	Low-----------	0.15			
Sm----------------	0-4	---	0.10-0.25	2.0-6.0	0.35-0.45	4.5-8.4	--------------	----	2	5	>25
Seelyeville	4-60	---	0.10-0.25	2.0-6.0	0.35-0.45	4.5-8.4	--------------	----			
So----------------	0-9	12-22	1.20-1.55	0.6-2.0	0.19-0.22	6.1-7.8	Low-----------	0.32	4	5	2-4
Shiffer	9-27	18-27	1.55-1.65	0.6-2.0	0.14-0.19	4.5-6.5	Moderate-----	0.32			
	27-31	6-15	1.55-1.65	0.6-6.0	0.08-0.14	4.5-6.5	Low-----------	0.24			
	31-60	2-8	1.60-1.70	6.0-20	0.04-0.10	4.5-6.5	Low-----------	0.15			
SrB, SrC2---------	0-9	9-17	1.40-1.55	0.6-2.0	0.22-0.24	5.1-7.3	Low-----------	0.37	5	5	2-4
Spencer	9-42	18-25	1.50-1.65	0.6-2.0	0.18-0.22	4.5-6.5	Moderate-----	0.37			
	42-60	10-20	1.75-1.90	0.2-0.6	0.08-0.18	4.5-6.5	Low-----------	0.28			
SsA, SsB----------	0-8	9-17	1.40-1.55	0.6-2.0	0.22-0.24	5.6-6.5	Low-----------	0.37	5	5	2-4
Spencer	8-50	18-25	1.50-1.65	0.6-2.0	0.20-0.22	4.5-6.0	Low-----------	0.37			
	50-60	1-6	1.50-1.80	>6.0	0.02-0.04	5.1-5.5	Low-----------	0.10			
TeB---------------	0-9	14-18	1.35-1.45	0.6-2.0	0.22-0.24	5.1-7.3	Low-----------	0.37	4	5	1-3
Tell	9-30	20-28	1.50-1.60	0.6-2.0	0.18-0.22	5.1-6.5	Moderate-----	0.37			
	30-35	10-25	1.50-1.60	0.6-2.0	0.11-0.19	5.1-6.5	Low-----------	0.37			
	35-60	2-8	1.55-1.70	6.0-20	0.04-0.07	5.1-6.5	Low-----------	0.15			
Ud.											
Udifluvents											
Ve----------------	0-12	10-20	1.35-1.55	0.6-2.0	0.20-0.24	4.5-6.0	Low-----------	0.37	4	5	4-6
Vesper	12-38	18-30	1.55-1.70	0.2-0.6	0.06-0.19	4.5-6.0	Moderate-----	0.37			
	38-60	2-45	1.55-1.70	0.06-0.2	0.06-0.17	4.5-6.5	Moderate-----	0.15			
Wb----------------	0-8	5-12	1.35-1.70	2.0-6.0	0.13-0.15	6.6-7.3	Low-----------	0.20	4	3	2-4
Warman Variant	8-24	5-12	1.40-1.70	2.0-6.0	0.07-0.14	5.6-6.0	Low-----------	0.20			
	24-60	1-6	1.50-1.60	6.0-20	0.02-0.04	5.6-6.0	Low-----------	0.10			
WeB---------------	0-8	12-18	1.20-1.45	0.6-2.0	0.19-0.24	4.5-7.3	Low-----------	0.37	5	5	3-4
Withee	8-23	12-22	1.55-1.65	0.2-2.0	0.18-0.22	4.5-5.5	Low-----------	0.37			
	23-42	18-25	1.80-1.90	0.2-0.6	0.11-0.19	4.5-5.5	Moderate-----	0.37			
	42-60	12-22	1.80-1.95	0.2-0.6	0.11-0.19	4.5-5.5	Low-----------	0.37			

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--SOIL AND WATER FEATURES

("Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Total subsidence	Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness			Uncoated steel	Concrete
					Ft			In		In			
AfB------------ Alban	B	None--------	---	---	3.0-6.0	Perched	Nov-Apr	>60	---	---	Moderate	Low------	Moderate.
AfC------------ Alban	B	None--------	---	---	>6.0	---	---	>60	---	---	Moderate	Low------	Moderate.
AgB------------ Almena	C	None--------	---	---	1.0-2.5	Apparent	Nov-May	>60	---	---	High-----	Low------	Moderate.
AlB, AlC, AlD, AlF----------- Amery	B	None--------	---	---	>6.0	---	---	>60	---	---	Moderate	Low------	High.
AnB, AnC2------- Antigo	B	None--------	---	---	>6.0	---	---	>60	---	---	High-----	Moderate	High.
AoA------------ Arenzville	B	Occasional	Brief-----	Apr-Oct	3.0-6.0	Apparent	Nov-May	>60	---	---	High-----	Moderate	Moderate.
ApB, ApC2, ApD2, AsB, AsC2, AsD2----------- Arland	B	None--------	---	---	>6.0	---	---	30-40	Soft	---	Low------	Moderate	Moderate.
Au------------- Auburndale	B/D	None--------	---	---	+1-1.0	Apparent	Nov-May	>60	---	---	High-----	High-----	Moderate.
Ba------------- Barronett	B/D	Rare--------	---	---	+1-1.0	Apparent	Sep-Jun	>60	---	---	High-----	Moderate	High.
Bb------------- Barronett	B/D	Frequent----	Brief to long.	Nov-Jun	+1-1.0	Apparent	Sep-Jun	>60	---	---	High-----	Moderate	High.
Be------------- Beseman	A/D	Rare--------	---	---	+1-1.0	Apparent	Jan-Dec	>60	---	>12	High-----	High-----	High.
BlA, BlB, BlC2-- Billett	B	None--------	---	---	>6.0	---	---	>60	---	---	Moderate	Low------	Moderate.
BmA------------ Billett	B	None--------	---	---	3.0-6.0	Apparent	Nov-Apr	>60	---	---	Moderate	Low------	Moderate.
BoE------------ Boone	A	None--------	---	---	>6.0	---	---	20-40	Soft	---	Low------	Low------	Moderate.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Total subsi-dence	Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard-ness			Uncoated steel	Concrete
					Ft			In		In			
BpA------------- Brill	B	None---------	---	---	2.5-3.5	Apparent	Sep-May	>60	---	---	High-----	Moderate	Moderate.
BuA------------- Burkhardt	B	None---------	---	---	>6.0	---	---	>60	---	---	Low------	Low------	High.
Cb-------------- Cable	B/D	None---------	---	---	+1-1.0	Apparent	Nov-May	>60	---	---	High-----	High-----	High.
CdB, CdC2, CdD2- Campia	B	None---------	---	---	>6.0	---	---	>60	---	---	High-----	Moderate	Moderate.
CeA------------- Caryville	B	Rare---------	---	---	>6.0	---	---	>60	---	---	Low------	Moderate	Moderate.
CkA, CkB, CkC2-- Chetek	B	None---------	---	---	>6.0	---	---	>60	---	---	Low------	Low------	High.
CkD2*, CkE*:													
Chetek----------	B	None---------	---	---	>6.0	---	---	>60	---	---	Low------	Low------	High.
Mahtomedi-------	A	None---------	---	---	>6.0	---	---	>60	---	---	Low------	Low------	High.
Cm-------------- Comstock	C	None---------	---	---	1.0-3.0	Apparent	Sep-May	>60	---	---	High-----	Moderate	High.
CuA------------- Crystal Lake	B	None---------	---	---	2.5-6.0	Perched	Sep-May	>60	---	---	High-----	Low------	High.
ElB, ElC2, ElD2- Eleva	B	None---------	---	---	>6.0	---	---	20-40	Soft	---	Moderate	Low------	Moderate.
EmB, EmC2, EmD2, EmE------------ Elkmound	D	None---------	---	---	>6.0	---	---	10-20	Soft	---	Moderate	Low------	Moderate.
Eo-------------- Elm Lake	A/D	None---------	---	---	+1-1.0	Apparent	Nov-May	30-50	Soft	---	Moderate	High-----	High.
FaB------------- Fallcreek	C	None---------	---	---	1.0-3.0	Perched	Nov-May	>60	---	---	High-----	Low------	High.
FbB, FbC2------- Flambeau	B	None---------	---	---	2.5-3.5	Perched	Nov-May	>60	---	---	Moderate	Low------	High.
Fm-------------- Fordum	D	Frequent----	Brief to long.-	Mar-Jun	+1-1.0	Apparent	Jan-Dec	>60	---	---	High-----	High-----	High.

See footnote at end of table.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Total subsidence	Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness			Uncoated steel	Concrete
					Ft			In		In			
FnB, FnC2------- Freeon	B	None--------	---	---	2.0-3.0	Perched	Nov-May	>60	---	---	Moderate	Low------	Moderate.
FrA------------- Friendship	A	None--------	---	---	2.5-6.0	Apparent	Nov-May	>60	---	---	Low------	Low------	High.
GaB, GaC2, GaD2- Gale	B	None--------	---	---	>6.0	---	---	20-40	Soft	---	High-----	Moderate	Moderate.
Gr-------------- Greenwood	A/D	None--------	---	---	+1-1.0	Apparent	Jan-Dec	>60	---	---	High-----	High-----	High.
Ha-------------- Halder	C	None--------	---	---	1.0-2.5	Apparent	Nov-May	>60	---	---	High-----	Moderate	Moderate.
HeB------------- Hiles	B	None--------	---	---	2.0-4.0	Perched	Nov-May	20-40	Soft	---	High-----	Moderate	High.
HfB------------- Hiles Variant	D	None--------	---	---	2.5-3.5	Perched	Nov-Jun	40-60	Soft	---	Moderate	Moderate	High.
HnB, HnC2------- Hixton	B	None--------	---	---	>6.0	---	---	20-40	Soft	---	Moderate	Low------	Moderate.
HuB, HuC2------- Humbird	B	None--------	---	---	2.5-6.0	Perched	Nov-May	24-40	Soft	---	Moderate	High-----	High.
KeB------------- Kert	C	None--------	---	---	1.0-3.0	Perched	Nov-May	>60	---	---	High-----	High-----	High.
La-------------- Lows	B/D	None--------	---	---	+1-1.0	Apparent	Nov-May	>60	---	---	High-----	High-----	Moderate.
LoB, LoC2------- Loyal	B	None--------	---	---	2.5-6.0	Perched	Nov-May	>60	---	---	Moderate	Moderate	High.
Lp-------------- Lupton	A/D	None--------	---	---	+1-1.0	Apparent	Jan-Dec	>60	---	50-55	High-----	High-----	Low.
MbB, McB-------- Magnor	C	None--------	---	---	0.5-3.0	Perched	Nov-Jun	>60	---	---	High-----	Low------	Moderate.
MdB, MdC-------- Mahtomedi	A	None--------	---	---	>6.0	---	---	>60	---	---	Low------	Low------	High.
Me-------------- Markey	A/D	None--------	---	---	+1-1.0	Apparent	Jan-Dec	>60	---	25-30	High-----	High-----	Low.

See footnote at end of table.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Total subsidence	Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness			Uncoated steel	Concrete
					Ft			In		In			
Mh-------------- Meehan	B	None--------	---	---	1.0-3.0	Apparent	Oct-May	>60	---	---	Moderate	Low------	Moderate.
MkB, MkC-------- Menahga	A	None--------	---	---	>6.0	---	---	>60	---	---	Low------	Low------	Moderate.
MlA, MlB-------- Meridian	B	None--------	---	---	>6.0	---	---	>60	---	---	Moderate	Low------	Moderate.
MmA------------- Meridian	B	None--------	---	---	3.0-6.0	Apparent	Nov-Apr	>60	---	---	Moderate	Low------	Moderate.
MrB------------- Merrillan	C	None--------	---	---	1.0-3.0	Apparent	Nov-May	24-40	Soft	---	High-----	High-----	High.
Mu-------------- Minocqua	B/D	None--------	---	---	+1-1.0	Apparent	Nov-Jun	>60	---	---	High-----	High-----	High.
MvA------------- Moundville	A	None--------	---	---	2.0-3.5	Apparent	Mar-May	>60	---	---	Low------	Low------	Moderate.
Na-------------- Newson	A/D	Rare--------	---	---	+1-1.0	Apparent	Nov-Jun	>60	---	---	Moderate	Low------	High.
NtB, NtC2, NtD2- Northfield	D	None--------	---	---	>6.0	---	---	10-20	Soft	---	Low------	Low------	Moderate.
Oe-------------- Oesterle	C	None--------	---	---	1.0-3.0	Apparent	Oct-May	>60	---	---	High-----	Low------	Moderate.
Or-------------- Orion	C	Frequent----	Brief-----	Mar-Nov	1.0-3.0	Apparent	Nov-May	>60	---	---	High-----	High-----	Low.
OsC2------------ Otterholt	B	None--------	---	---	>6.0	---	---	>60	---	---	High-----	Low------	High.
Pc*. Pits													
PdB, PdC, PdD--- Plainbo	A	None--------	---	---	>6.0	---	---	20-40	Soft	---	Low------	Low------	Moderate.
Pv-------------- Plover	C	None--------	---	---	1.0-3.0	Apparent	Nov-May	>60	---	---	High-----	Moderate	High.
Px-------------- Poskin	C	None--------	---	---	1.0-3.0	Apparent	Oct-May	>60	---	---	High-----	Low------	Moderate.

See footnote at end of table.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Total subsidence	Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness			Uncoated steel	Concrete
					Ft			In		In			
Rb, Rc---------- Rib	B/D	Occasional	Brief to long.	Nov-Jun	+1-1.0	Apparent	Sep-May	>60	---	---	High-----	High-----	High.
RfA------------ Richford	A	None--------	---	---	>6.0	---	---	>60	---	---	Low------	Low------	Moderate.
RoA, RoB, RoC2, RpA, RpB, RpC2- Rosholt	B	None--------	---	---	>6.0	---	---	>60	---	---	Moderate	Low------	Moderate.
SaB, SaC2, SaD2- Santiago	B	None--------	---	---	>6.0	---	---	>60	---	---	Moderate	Low------	High.
SbA------------ Sattre	B	None--------	---	---	>6.0	---	---	>60	---	---	Low------	Low------	High.
ScB, SdA-------- Scott Lake	B	None--------	---	---	2.5-6.0	Apparent	Nov-May	>60	---	---	Moderate	Low------	High.
SeB, SeC2, SeD2- Seaton	B	None--------	---	---	>6.0	---	---	>60	---	---	High-----	Low------	Moderate.
SfA------------ Seaton	B	None--------	---	---	3.0-6.0	Apparent	Nov-Apr	>60	---	---	High-----	Low------	Moderate.
SgA, SgB-------- Seaton	B	None--------	---	---	>6.0	---	---	>60	---	---	High-----	Low------	Moderate.
Sm------------- Seelyeville	A/D	Rare--------	---	---	+1-1.0	Apparent	Jan-Dec	>60	---	50-55	High-----	High-----	Moderate.
So------------- Shiffer	C	None--------	---	---	1.0-3.0	Apparent	Nov-May	>60	---	---	High-----	Moderate	Moderate.
SrB, SrC2------- Spencer	B	None--------	---	---	2.5-6.0	Apparent	Nov-May	>60	---	---	High-----	Low------	High.
SsA, SsB-------- Spencer	B	None--------	---	---	3.0-6.0	Perched	Nov-May	>60	---	---	High-----	Low------	High.
TeB------------ Tell	B	None--------	---	---	>6.0	---	---	>60	---	---	High-----	Moderate	Moderate.
Ud. Udifluvents													
Ve------------- Vesper	D	None--------	---	---	+1-1.0	Perched	Nov-Jun	42-60	Soft	---	High-----	High-----	Moderate.

See footnote at end of table.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Total subsi-dence	Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard-ness			Uncoated steel	Concrete
					Ft			In		In			
Wb-------------- Warman Variant	B	None--------	---	---	1.0-3.0	Apparent	Nov-May	>60	---	---	Moderate	High-----	Moderate.
WeB------------- Withee	C	None--------	---	---	0.5-2.0	Perched	Nov-May	>60	---	---	High-----	Low------	High.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 18.--ENGINEERING INDEX TEST DATA

(Dashes indicate that data were not available. MAX means maximum dry density; OPT, optimum moisture; LL, liquid limit; PI, plasticity index; UN, Unified; and NP, nonplastic)

Soil name and location	Parent material	Report number	Depth	Moisture density		Percentage passing sieve*--				Percentage smaller than*--				LL	PI	Classification	
				MAX	OPT	No. 4	No. 10	No. 40	No. 200	0.05 mm	0.02 mm	0.005 mm	0.002 mm			AASHTO	UN
			In	Lb/cf	Pct									Pct			
Alban fine sandy loam: SE1/4SW1/4 sec. 2, T. 32 N., R. 6 W.	Loamy lacustrine deposits.	S75WI-017- 2-1	24-34	---	---	100	100	99	71	50	18	12	10	---	NP	A-4(7)	ML
		2-2	38-60	112.1	12.7	100	100	95	42	22	7	4	2	---	NP	A-4(1)	SM
Almena silt loam: NW1/4NW1/4 sec. 16, T. 29 N., R. 6 W.	Silty deposits over gravelly sandy loam glacial till.	S82WI-017- 14-1	18-24	---	---	100	100	100	98	92	60	28	22	34	10	A-4(8)	CL
		14-2	24-36	---	---	100	100	100	97	88	49	24	20	33	11	A-4(8)	CL
		14-3	48-60	---	---	96	93	82	48	42	24	11	8	20	4	A-4(3)	SM
Amery sandy loam**: SE1/4NE1/4 sec. 36, T. 32 N., R. 9 W.	Loamy deposits underlain by loamy sand or sandy loam glacial till.	S79WI-017- 15-1	11-22	---	---	95	92	78	40	35	24	10	5	---	NP	A-4(1)	SM
		15-2	32-60	131.0	7.2	79	74	56	18	14	7	3	1	12	NP	A-2-4 (0)	SM
Arland sandy loam: NE1/4NW1/4 sec. 36, T. 29 N., R. 10 W.	Loamy glacial till underlain by sandy residuum and sandstone.	S79WI-017- 12-1	12-25	---	---	95	94	86	54	49	35	19	15	26	9	A-4(4)	CL
		12-2	28-36	---	---	90	87	67	19	16	13	8	7	---	NP	A-2-4 (0)	SM
Barronett silt loam: SW1/4SW1/4 sec. 22, T. 31 N., R. 6 W.	Silty lacustrine deposits underlain by silty and sandy deposits.	S81WI-017- 2-1	13-23	---	---	100	100	99	95	83	44	19	14	33	9	A-4(8)	ML
		2-2	23-34	---	---	100	100	99	95	89	44	18	13	30	7	A-4(8)	CL
		2-3	34-60	---	---	100	100	99	94	88	45	18	12	30	7	A-4(8)	CL

See footnotes at end of table.

TABLE 18.--ENGINEERING INDEX TEST DATA--Continued

Soil name and location	Parent material	Report number	Depth	Moisture density		Percentage passing sieve*--				Percentage smaller than*--				LL	PI	Classification	
				MAX	OPT	No. 4	No. 10	No. 40	No. 200	0.05 mm	0.02 mm	0.005 mm	0.002 mm			AASHTO	UN
			In	Lb/cf	Pct									Pct			
Campia silt loam: SW1/4SW1/4 sec. 30, T. 32 N., R. 8 W.	Silty lacustrine deposits underlain by silty and sandy deposits.	S76WI-017- 3-1	24-34	---	---	100	100	100	97	95	74	45	33	37	19	A-6(11)	CL
		3-2	42-60	105.4	17.2	100	100	100	99	96	79	46	33	38	19	A-6(11)	CL
Chetek sandy loam: NW1/4NE1/4 sec. 22, T. 29 N., R. 7 W.	Loamy deposits over stratified sand and gravel.	S75WI-017- 4-1	13-17	---	---	81	75	54	23	22	17	11	9	22	8	A-2-4 (0)	SC
		4-2	17-20	---	---	83	75	50	11	10	7	4	3	---	NP	A-2-4 (0)	SP-SM
		4-3	20-60	---	---	61	49	15	2	2	2	1	1	---	NP	A-1-a (0)	SP
Comstock silt loam: NE1/4SW1/4 sec. 27, T. 31 N., R. 6 W.	Silty lacustrine deposits.	S77WI-017- 1-1	24-30	---	---	100	100	100	99	92	56	29	23	36	15	A-6(10)	CL
		1-2	40-60	---	---	100	100	99	90	76	37	17	11	26	NP	A-4(8)	ML
Elkmound loam: SE1/4SW1/4 sec. 1, T. 28 N., R. 10 W.	Loamy deposits over sandstone.	S79WI-017- 11-1	9-14	---	---	96	95	84	47	41	25	9	5	---	NP	A-4(2)	SM
Fallcreek sandy loam: NW1/4NE1/4 sec. 23, T. 28 N., R. 6 W.	Loamy glacial till.	S81WI-017- 7-1	12-20	---	---	100	100	94	70	63	39	14	9	---	NP	A-4(7)	ML
		7-2	20-28	---	---	93	89	76	35	29	20	10	7	---	NP	A-4(0)	SM
		7-3	28-42	---	---	93	89	75	31	26	18	11	9	21	5	A-2-4 (0)	SM-SC
		7-4	42-60	---	---	93	79	67	28	23	15	10	8	21	6	A-2-4 (0)	SM-SC

See footnotes at end of table.

TABLE 18.--ENGINEERING INDEX TEST DATA--Continued

Soil name and location	Parent material	Report number	Depth	Moisture density		Percentage passing sieve*--				Percentage smaller than*--				LL	PI	Classification	
				MAX	OPT	No. 4	No. 10	No. 40	No. 200	0.05 mm	0.02 mm	0.005 mm	0.002 mm			AASHTO	UN
			In	Lb/cf	Pct									Pct			
Halder loam: SE1/4SE1/4 sec. 2, T. 31 N., R. 9 W.	Loamy deposits over sand and gravel.	S79WI-017- 13-1	16-30	---	---	100	100	93	64	59	47	22	16	28	10	A-6(6)	CL
Hiles silt loam: NE1/4NE1/4 sec. 30, T. 28 N., R. 7 W.	Silty deposits and material weathered from sandstone interbedded with shale.	S83WI-017- 3-1 3-2	22-26 26-30	--- ---	--- ---	100 100	100 100	95 92	74 65	70 59	54 42	32 24	27 20	38 29	17 11	A-6(11) A-6(6)	CL CL
Loyal silt loam: SE1/4SW1/4 sec. 9, T. 28 N., R. 5 W.	Silty deposits and loamy glacial till.	S83WI-017- 5-1 5-2 5-3	15-21 21-32 32-60	--- --- 121.6	--- --- 10.6	100 100 92	100 100 90	100 100 82	99 98 57	90 90 49	48 50 31	21 24 18	17 19 13	28 36 24	5 11 8	A-4(8) A-6(8) A-4(4)	ML ML CL
Magnor silt loam: SE1/4SW1/4 sec. 15, T. 32 N., R. 5 W.	Silty deposits and sandy loam glacial till.	S80WI-017- 2-1 2-2 2-3	15-19 19-25 29-60	--- --- 130.3	--- --- 9.1	98 88 86	96 85 81	90 72 67	79 41 33	73 37 28	46 27 19	15 14 11	9 10 8	20 23 19	NP 7 4	A-4(8) A-4(1) A-2-4 (0)	ML SM-SC SM-SC
Meridian loam: SW1/4SW1/4 sec. 26, T. 28 N., R. 10 W.	Loamy deposits underlain by sand.	S77WI-017- 1-3	11-32	---	---	100	100	91	59	54	33	18	15	21	5	A-4(5)	CL-ML
Northfield silt loam: SE1/4SW1/4 [illegible] N., R. 10 W.	Silty deposits underlain by [illegible]	S75WI-017- 1-1	10-15	---	---	96	96	93	70	54	44	22	15	23	5	A-4(7)	CL-ML

See footnotes at end of table.

TABLE 18.--ENGINEERING INDEX TEST DATA--Continued

Soil name and location	Parent material	Report number	Depth	Moisture density		Percentage passing sieve*--				Percentage smaller than*--				LL	PI	Classification	
				MAX	OPT	No. 4	No. 10	No. 40	No. 200	0.05 mm	0.02 mm	0.005 mm	0.002 mm			AASHTO	UN
			In	Lb/cf	Pct									Pct			
Otterholt silt loam: SW1/4SW1/4 sec. 14, T. 29 N., R. 6 W.	Silty deposits over sandy loam glacial till.	S80WI-017-															
		3-1	21-28	---	---	100	100	100	97	89	41	19	15	28	4	A-4(8)	ML
		3-2	34-40	---	---	100	100	99	94	83	36	16	13	29	7	A-4(8)	CL
		3-3	40-60	---	---	81	77	67	38	31	13	4	2	---	NP	A-4(1)	SM
Rosholt sandy loam: SE1/4SE1/4 sec. 25, T. 29 N., R. 7 W.	Loamy deposits underlain by stratified sand and gravel.	S61WI-017-															
		1-1	19-26	134.0	8.0	94	92	73	26	23	17	9	7	---	NP	A-2-4 (0)	SM
		1-2	40-60	142.0	6.0	40	30	14	4	4	2	1	1	---	NP	A-1-a (0)	GP
Rosholt sandy loam: NE1/4NE1/4 sec. 30, T. 30 N., R. 8 W.	Loamy deposits underlain by stratified sand and gravel.	S80WI-017-															
		2-1	19-27	---	---	100	100	78	36	34	27	15	13	21	7	A-4(0)	SM-SC
		2-2	30-60	---	---	42	36	11	2	2	1	1	1	---	NP	A-1-a (0)	GP
Rosholt loam: SW1/4SW1/4 sec. 5, T. 31 N., R. 8 W.	Loamy deposits underlain by stratified sand and gravel.	S62WI-017-															
		3-1	16-22	---	---	81	81	70	46	45	34	20	16	30	13	A-6(3)	SC
		3-2	29-42	---	---	45	32	13	4	3	2	1	1	---	NP	A-1-a (0)	GP
Santiago silt loam: SE1/4SE1/4 sec. 10, T. 29 N., R. 6 W.	Silty deposits and underlying sandy loam glacial till.	S82WI-017-															
		13-1	13-16	---	---	98	96	95	93	86	46	21	14	25	5	A-4(8)	CL-ML
		13-2	19-24	---	---	88	84	74	46	40	27	13	9	25	9	A-4(2)	SC
		13-3	30-60	---	---	82	77	63	30	26	19	10	6	17	3	A-2-4 (0)	SM
Sattre loam: SW1/4NW1/4 sec. 18, T. 29 N., R. 8 W.	Loamy deposits over sand and gravel.	S74WI-017-															
		1-1	18-28	---	---	100	100	92	54	50	37	22	18	26	10	A-4(4)	CL
		1-2	34-60	---	---	90	83	29	4	3	3	2	2	---	NP	A-1-6 (0)	SW

See footnotes at end of table.

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TABLE 18.--ENGINEERING INDEX TEST DATA--Continued

Soil name and location	Parent material	Report number	Depth	Moisture density		Percentage passing sieve*--				Percentage smaller than*--				LL	PI	Classi- fication	
				MAX	OPT	No. 4	No. 10	No. 40	No. 200	0.05 mm	0.02 mm	0.005 mm	0.002 mm			AASHTO	UN
			In	Lb/ cf	Pct									Pct			
Seaton silt loam: NE1/4 NW1/4 sec. 5, T. 28 N., R. 9 W.	Silty deposits.	S79WI-017-															
		10-1	16-34	---	---	100	100	100	92	84	42	23	19	34	13	A-6(9)	CL
		10-2	41-60	---	---	100	100	100	97	93	46	21	16	32	8	A-4(8)	CL
Spencer silt loam: SW1/4SW1/4 sec. 21, T. 31 N., R. 6 W.	Silty deposits underlain by sandy loam glacial till.	S83WI-017-															
		11-1	20-32	---	---	100	100	99	96	87	44	24	19	32	8	A-4(8)	ML
		11-2	34-60	129.8	9.2	90	85	73	42	35	24	12	7	17	4	A-4(1)	ML
Withee silt loam: SW1/4NW1/4 sec. 1, T. 28 N., R. 5 W.	Silty deposits and loamy glacial till.	S82WI-017-															
		17-1	12-18	---	---	100	100	100	98	91	53	20	14	26	6	A-4(8)	CL-ML
		17-2	23-34	---	---	85	83	69	39	35	25	17	13	36	12	A-6(1)	SC
		17-3	42-60	---	---	93	91	76	40	35	25	15	12	22	3	A-4(1)	SC

* Mechanical analysis according to the AASHTO Designation T88-57 (1). Results from this procedure can differ somewhat from the results obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHTO procedure, the fine material is analyzed by hydrometer method and the various grain-size fractions are calculated on the basis of all material up to and including that 3 inches in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method and the material coarser than 2 millimeters in diameter is excluded from the calculation of grain-size fractions. The mechanical analysis data given in this table are not suitable for use in naming textural classes of soils.

** The soil is a taxadjunct. See the series description for an explanation.

TABLE 19.--CLASSIFICATION OF THE SOILS

(An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series)

Soil name	Family or higher taxonomic class
Alban	Coarse-loamy, mixed Typic Glossoboralfs
Almena	Fine-silty, mixed, frigid Aeric Glossaqualfs
*Amery	Coarse-loamy, mixed Typic Glossoboralfs
Antigo	Fine-silty over sandy or sandy-skeletal, mixed Typic Glossoboralfs
Arenzville	Coarse-silty, mixed, nonacid, mesic Typic Udifluvents
Arland	Coarse-loamy, mixed Eutric Glossoboralfs
Auburndale	Fine-silty, mixed, frigid Typic Glossaqualfs
Barronett	Fine-silty, mixed, frigid Mollic Ochraqualfs
Beseman	Loamy, mixed, dysic Terric Borosaprists
Billett	Coarse-loamy, mixed, mesic Mollic Hapludalfs
Boone	Mesic, uncoated Typic Quartzipsamments
*Brill	Fine-silty over sandy or sandy-skeletal, mixed Typic Glossoboralfs
Burkhardt	Sandy, mixed, mesic Typic Hapludolls
Cable	Coarse-loamy, mixed, nonacid, frigid Typic Haplaquepts
Campia	Fine-silty, mixed Typic Glossoboralfs
Caryville	Sandy, mixed Fluventic Haploborolls
Chetek	Coarse-loamy, mixed Eutric Glossoboralfs
Comstock	Fine-silty, mixed Aquic Glossoboralfs
Crystal Lake	Fine-silty, mixed Typic Glossoboralfs
Eleva	Coarse-loamy, mixed, mesic Typic Hapludalfs
Elkmound	Loamy, mixed, mesic Lithic Dystrochrepts
Elm Lake	Sandy over loamy, mixed, acid, frigid Typic Haplaquents
Fallcreek	Coarse-loamy, mixed Aquic Glossoboralfs
Flambeau	Fine-loamy, mixed Typic Glossoboralfs
*Fordum	Coarse-loamy, mixed, nonacid, frigid Mollic Fluvaquents
Freeon	Coarse-loamy, mixed Typic Glossoboralfs
Friendship	Mixed, frigid Typic Udipsamments
Gale	Fine-silty over sandy or sandy-skeletal, mixed, mesic Typic Hapludalfs
Greenwood	Dysic Typic Borohemists
Halder	Fine-loamy over sandy or sandy-skeletal, mixed Aquic Glossoboralfs
Hiles	Fine-loamy, mixed Typic Glossoboralfs
Hiles Variant	Fine, mixed Typic Glossoboralfs
Hixton	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Typic Hapludalfs
Humbird	Coarse-loamy over clayey, mixed, frigid Alfic Haplorthods
Kert	Fine-loamy, mixed Aquic Glossoboralfs
Lows	Fine-loamy over sandy or sandy-skeletal, mixed, nonacid, frigid Mollic Haplaquepts
Loyal	Fine-loamy, mixed Typic Glossoboralfs
Lupton	Euic Typic Borosaprists
Magnor	Coarse-loamy, mixed Aquic Glossoboralfs
Mahtomedi	Mixed, frigid Typic Udipsamments
Markey	Sandy or sandy-skeletal, mixed, euic Terric Borosaprists
Meehan	Mixed, frigid Aquic Udipsamments
Menahga	Mixed, frigid Typic Udipsamments
Meridian	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Mollic Hapludalfs
*Merrillan	Coarse-loamy over clayey, mixed, frigid Aqualfic Haplorthods
*Minocqua	Coarse-loamy over sandy or sandy-skeletal, mixed, nonacid, frigid Typic Haplaquepts
Moundville	Sandy, mixed, mesic Psammentic Hapludalfs
Newson	Mixed, frigid Humaqueptic Psammaquents
Northfield	Loamy, mixed, mesic Lithic Hapludalfs
Oesterle	Coarse-loamy, mixed Aquic Glossoboralfs
Orion	Coarse-silty, mixed, nonacid, mesic Aquic Udifluvents
Otterholt	Fine-silty, mixed Typic Glossoboralfs
Plainbo	Mixed, frigid Typic Udipsamments
Plover	Coarse-loamy, mixed Aquic Glossoboralfs
*Poskin	Fine-silty over sandy or sandy-skeletal, mixed Aquic Glossoboralfs
Rib	Fine-silty over sandy or sandy-skeletal, mixed, nonacid, frigid Mollic Haplaquepts
Richford	Sandy, mixed, mesic Psammentic Hapludalfs
Rosholt	Coarse-loamy, mixed Typic Glossoboralfs

TABLE 19.--CLASSIFICATION OF THE SOILS--Continued

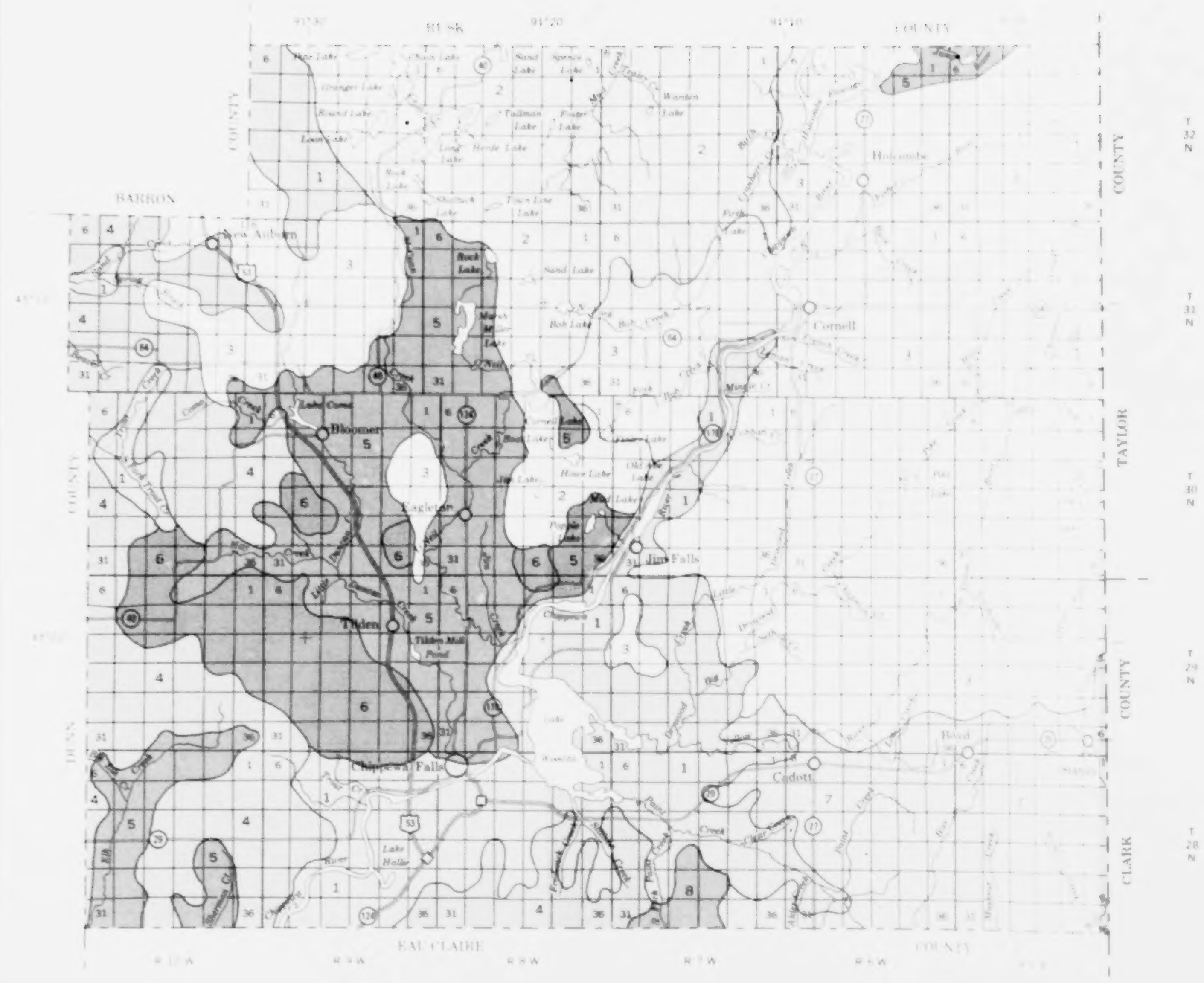
Soil name	Family or higher taxonomic class
Santiago	Fine-loamy, mixed Typic Glossoboralfs
Sattre	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Mollic Hapludalfs
Scott Lake	Coarse-loamy, mixed Typic Glossoboralfs
Seaton	Fine-silty, mixed, mesic Typic Hapludalfs
Seelyeville	Euic Typic Borosaprists
Shiffer	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Aquollic Hapludalfs
Spencer	Fine-silty, mixed Typic Glossoboralfs
Tell	Fine-silty over sandy or sandy-skeletal, mixed, mesic Typic Hapludalfs
Udifluvents	Loamy, mixed, nonacid, frigid Aquic Udifluvents
Vesper	Fine-loamy over sandy or sandy-skeletal, mixed, acid, frigid Humic Haplaquept
Warman Variant	Sandy, mixed Aquic Haploborolls
Withee	Fine-loamy, mixed Aquic Glossoboralfs

U.S. GOVERNMENT PRINTING OFFICE : 1989 O - [illegible]

MAPS

TRANSPOSED TO

END OF VOLUME


RUSK
BARRON
TAYLOR
COUNTY
CLARK
DUNN
EAU CLAIRE
Wissota
Tilden
T 32 N
T 31 N
T 30 N
T 29 N
T 28 N
R 10 W
R 9 W
R 8 W
R 7 W
R 6 W

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

SOIL LEGEND*

1	MENAHGA FRIENDSHIP association: Deep, nearly level to sloping, excessively drained and moderately well drained, sandy soils on outwash plains and stream terraces
2	AMERY SANTIAGO association: Deep, gently sloping to very steep, well drained, loamy and silty soils on moraines
3	SPENCER MAGNOR ALMENA association: Deep, nearly level to sloping, moderately well drained and somewhat poorly drained, silty soils on moraines
4	ELKMOUND PLAINBO ELEVA association: Shallow and moderately deep, gently sloping to very steep, well drained to excessively drained, loamy and sandy soils on uplands, outwash plains, and stream terraces
5	BILLETT ROSHOLT OESTERLE association: Deep, nearly level to sloping, well drained to somewhat poorly drained, loamy soils on outwash plains and stream terraces
6	SEATON GALE association: Deep and moderately deep, nearly level to steep, moderately well drained and well drained, silty soils on uplands
7	FLAMBEAU FALLCREEK WITHEE association: Deep, nearly level to sloping, moderately well drained and somewhat poorly drained, loamy and silty soils on ground moraines
8	KERT ELM LAKE VESPER association: Deep and moderately deep, nearly level and gently sloping, somewhat poorly drained and poorly drained, silty and sandy soils on uplands

*Texture terms in the descriptive headings refer to the surface layer of the major soils in the associations

COMPILED 1986

SECTIONALIZED TOWNSHIP

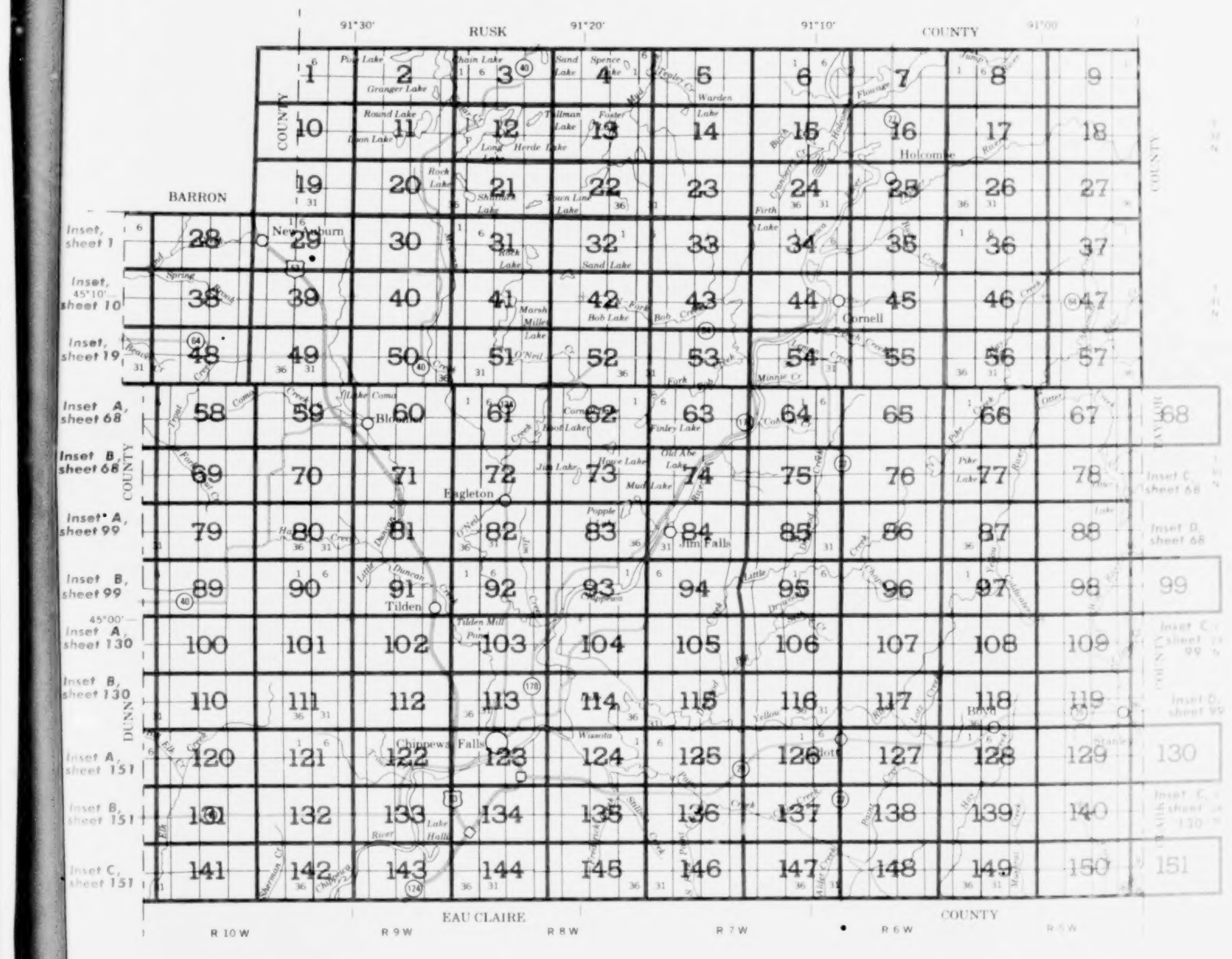
6 5 4 3 2 1
7 8 9 10 11 12
18 17 16 15 14 13
19 20 21 22 23 24
30 29 28 27 26 25
31 32 33 34 35 36

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
THE RESEARCH DIVISION OF THE COLLEGE OF AGRICULTURAL AND LIFE SCIENCES
UNIVERSITY OF WISCONSIN

GENERAL SOIL MAP
CHIPPEWA COUNTY, WISCONSIN

N

Scale 1:253,440
1 0 1 2 3 4 Miles
1 0 4 8 Km


91°30'
RUSK
91°20'
91°10'
COUNTY
BARRON
COUNTY
DUNN
EAU CLAIRE
COUNTY
R 10 W
R 9 W
R 8 W
R 7 W
R 6 W
Inset, sheet 1
Inset, sheet 10
Inset, sheet 19
Inset A, sheet 68
Inset B, sheet 68
Inset A, sheet 99
Inset B, sheet 99
Inset A, sheet 130
Inset B, sheet 130
Inset A, sheet 151
Inset B, sheet 151
Inset C, sheet 151
1 2 3 4 5 6 7 8 9
10 11 12 13 14 15 16 17 18
19 20 21 22 23 24 25 26 27
28 29 30 31 32 33 34 35 36 37
38 39 40 41 42 43 44 45 46 47
48 49 50 51 52 53 54 55 56 57
58 59 60 61 62 63 64 65 66 67 68
69 70 71 72 73 74 75 76 77 78
79 80 81 82 83 84 85 86 87 88
89 90 91 92 93 94 95 96 97 98 99
100 101 102 103 104 105 106 107 108 109
110 111 112 113 114 115 116 117 118 119
120 121 122 123 124 125 126 127 128 129 130
131 132 133 134 135 136 137 138 139 140
141 142 143 144 145 146 147 148 149 150 151

INDEX TO MAP SHEETS
CHIPPEWA COUNTY, WISCONSIN

N

Scale 1:253,440
1 0 1 2 3 4 Miles
1 0 4 8 Km

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U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

CHIPPEWA COUNTY, WISCONSIN

THE RESEARCH DIVISION OF THE COLLEGE OF AGRICULTURAL AND LIFE SCIENCES
UNIVERSITY OF WISCONSIN

SOIL LEGEND

[illegible]

SYMBOL	NAME	SYMBOL	NAME
[illegible]	[illegible]	[illegible]	[illegible]

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

County

Field sheet matchline & neatline

AD HOC BOUNDARY

Small airport, airfield

STATE COORDINATE TICK

LAND DIVISION CORNERS (sections and land grants)

ROADS

Divided

Other roads

ROAD EMBLEMS & DESIGNATIONS

Federal

State

County

RAILROAD

LEVEES

Without road

With road

DAMS

Large

Medium or small

PITS

Gravel pit

Quarry

MISCELLANEOUS CULTURAL FEATURES

Farmstead

Church

School

WATER FEATURES

DRAINAGE

Perennial, double line

Perennial, single line

Intermittent

Drainage end

Drainage ditch

LAKES, PONDS AND RESERVOIRS

Perennial

Intermittent

MISCELLANEOUS WATER FEATURES

Spring

Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS CeA RoB

ESCARPMENTS

Other than bedrock (points down slope)

SHORT STEEP SLOPE

MISCELLANEOUS

Blowout

Cut and fill

Gravelly spot

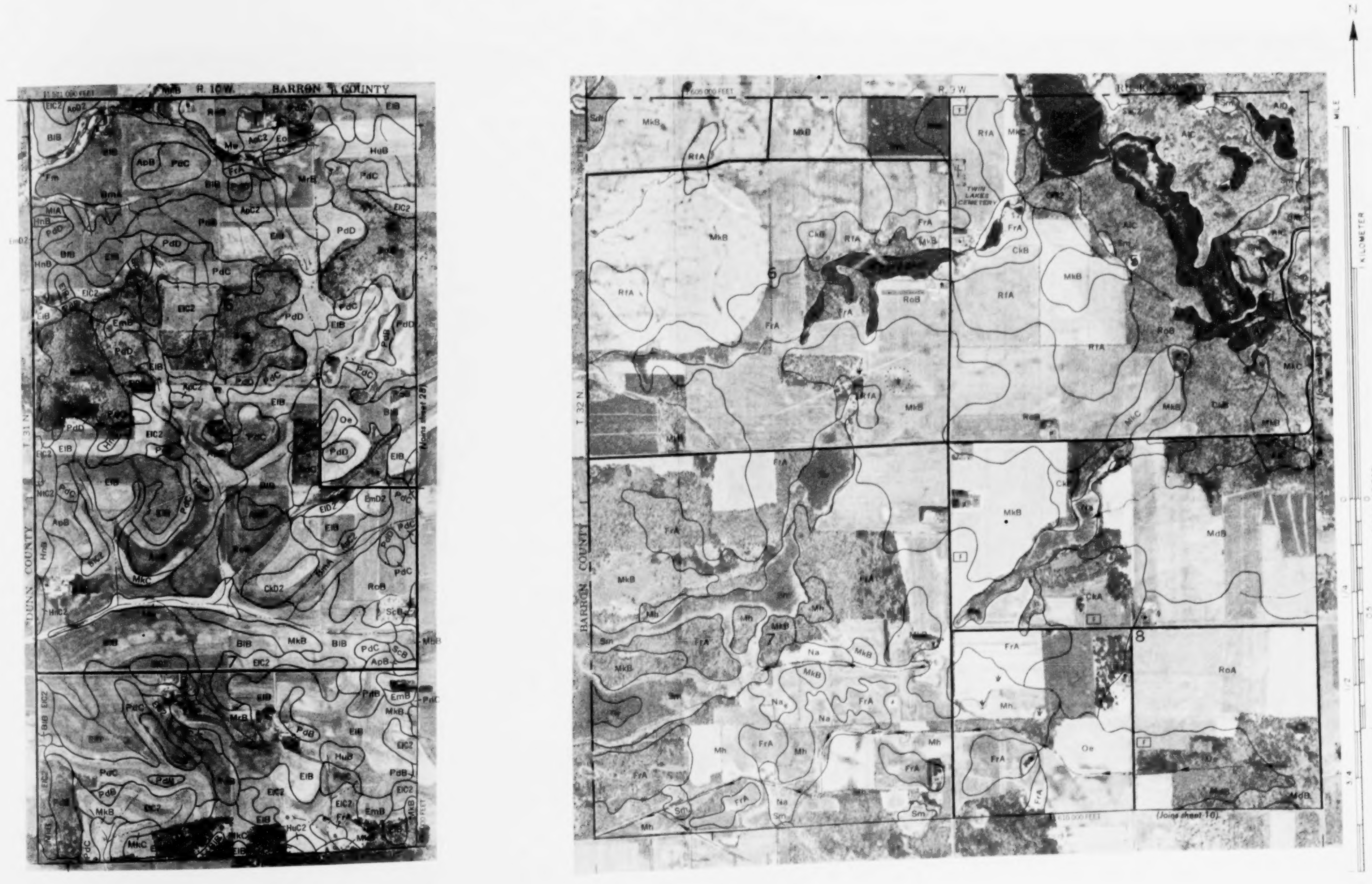
Rock outcrop

Sandy spot

Sanitary landfill

Very stony spot

SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 1



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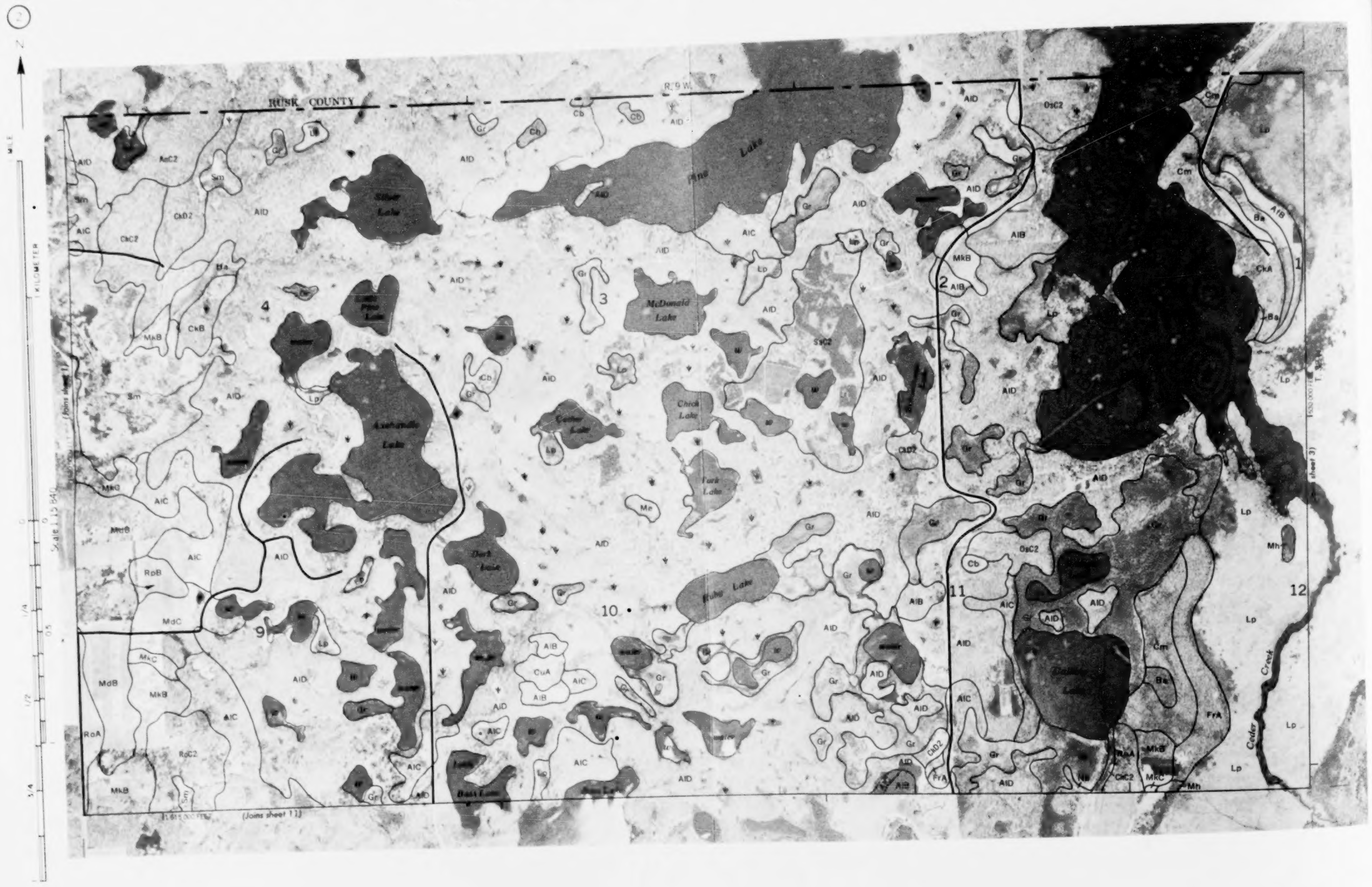
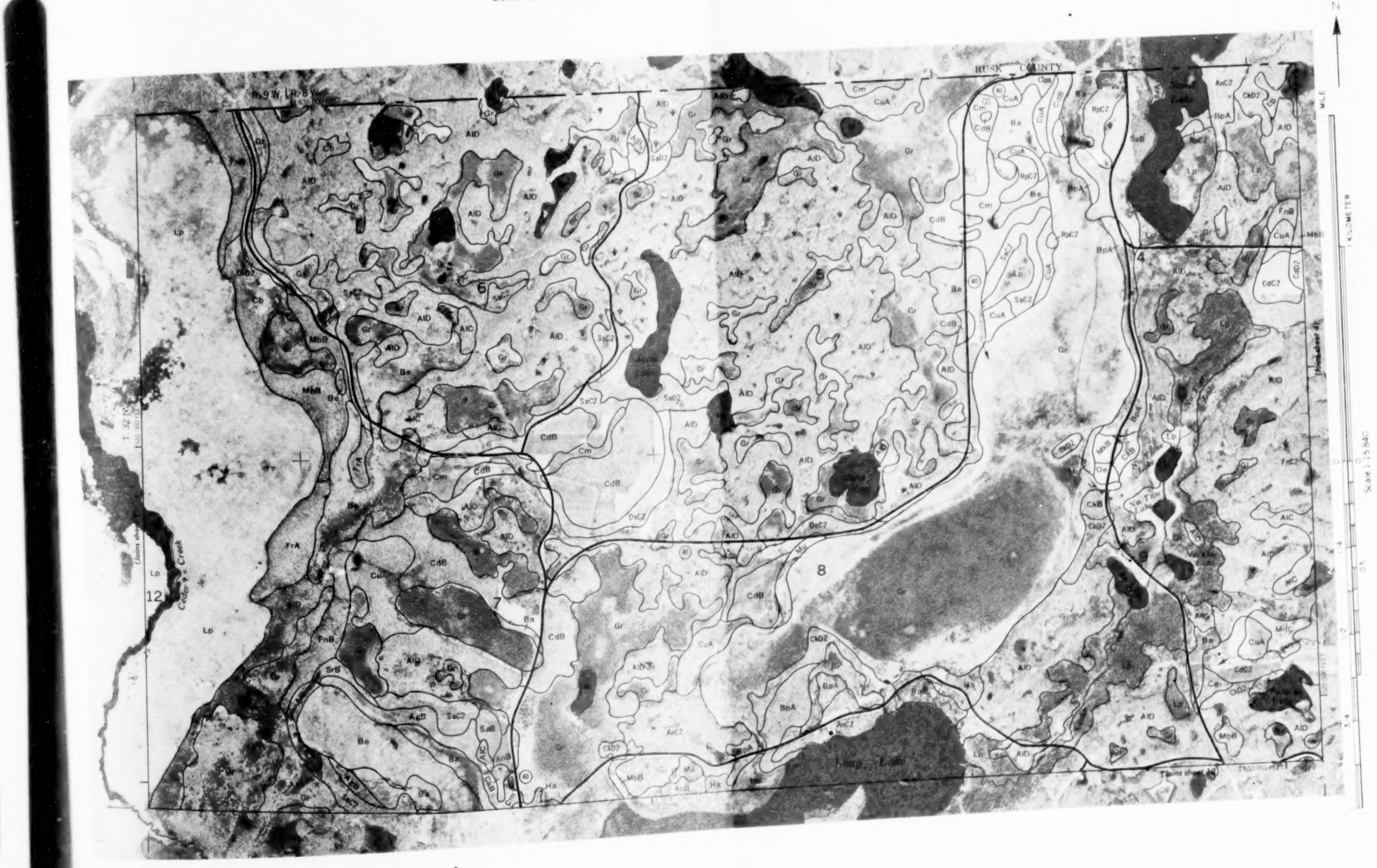
SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 2



N
RUSK COUNTY
Pine Lake
Otter Lake
McDonald Lake
Axehandle Lake
Crick Lake
Cedar Lake
Bass Lake
4
3
2
1
9
10
11
12
AlD
AlC
AlB
MkB
DdC2
CkB
Lp
(Joins sheet 11)

SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 3



N
RUSK COUNTY
6
4
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12
AlD
AlC
CdB
Lp
MkB
TaC2
Scale 1:15 840

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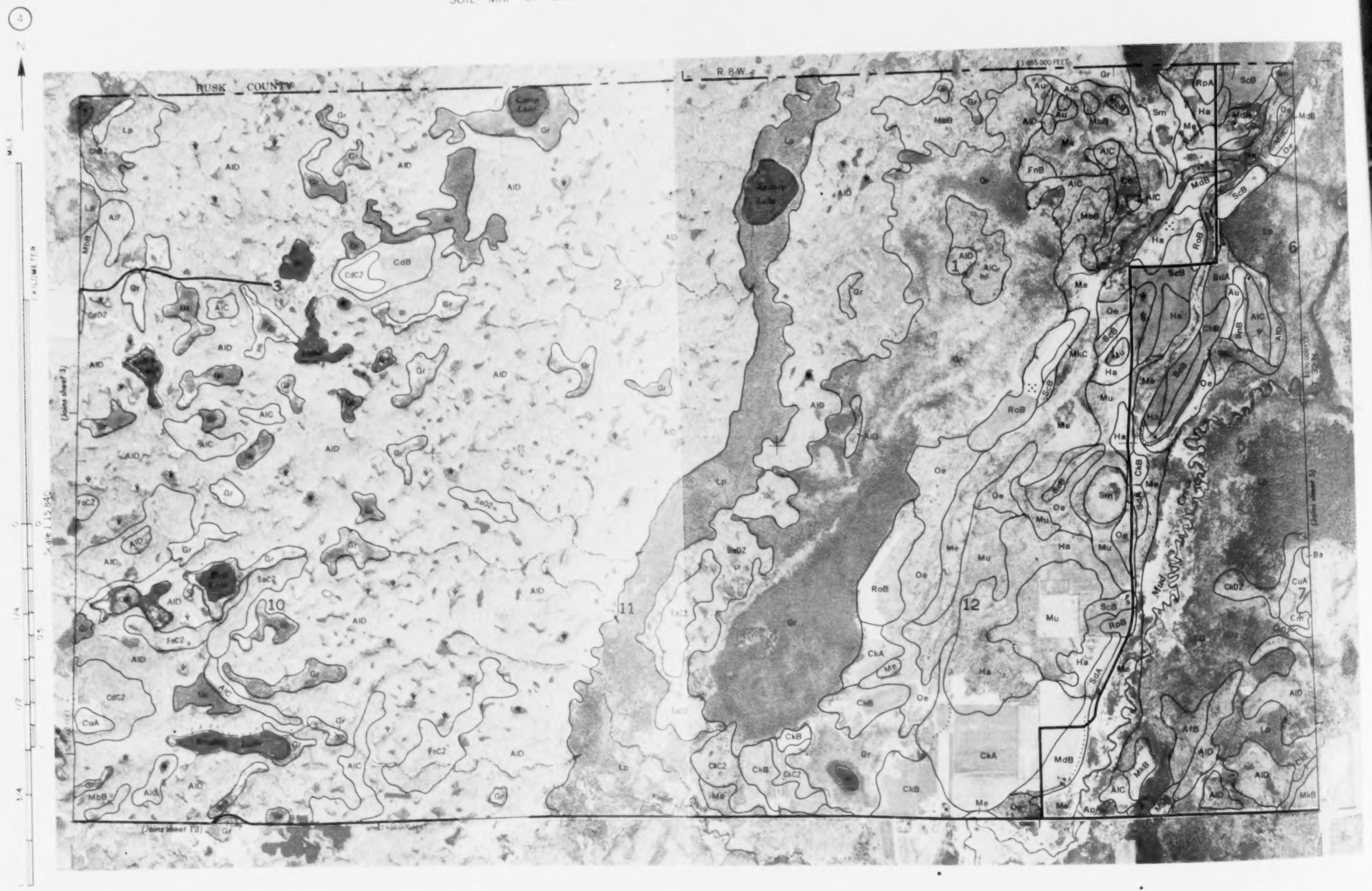
SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 4


RUSK COUNTY
R. 6 W.
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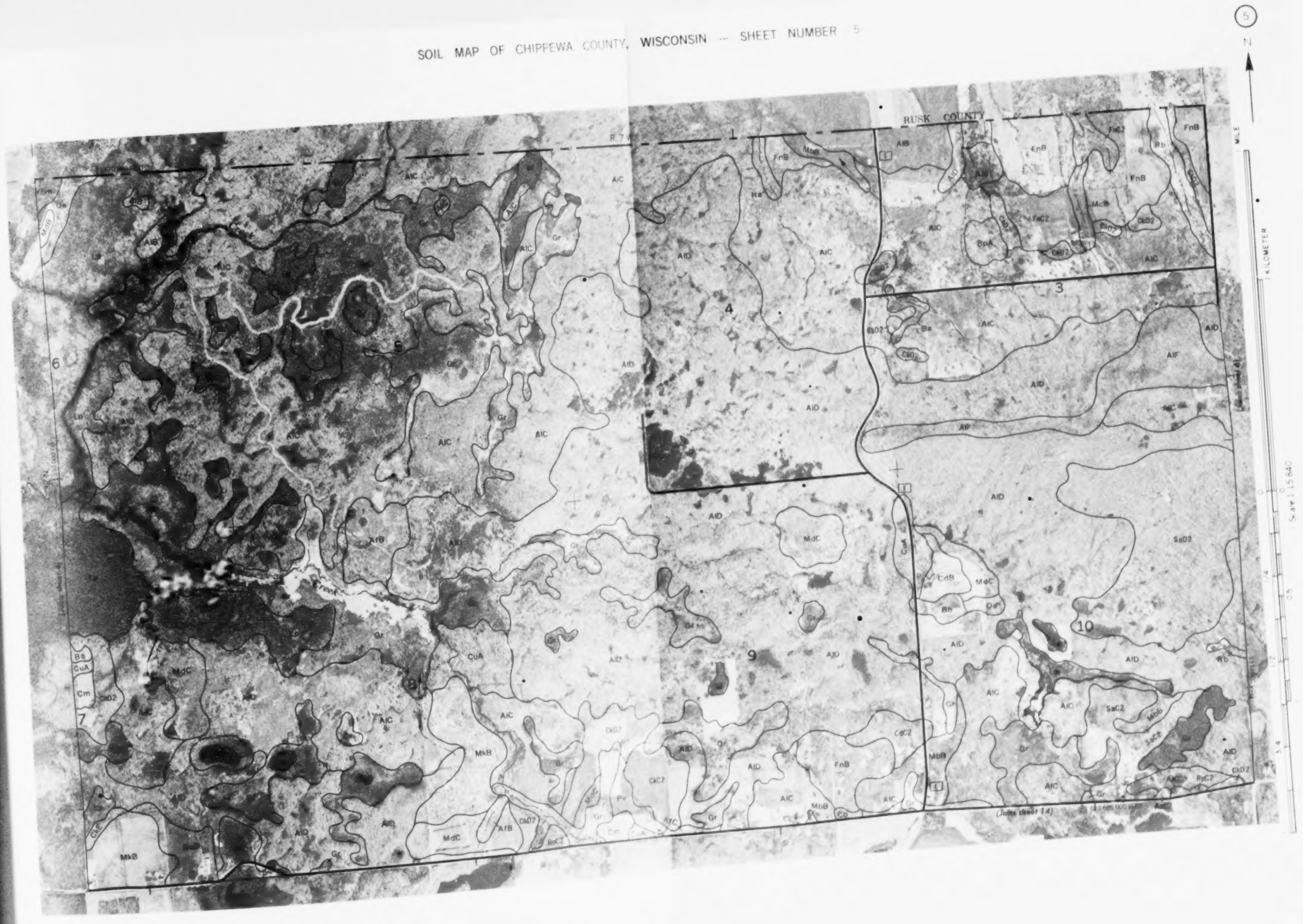
SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 5


RUSK COUNTY
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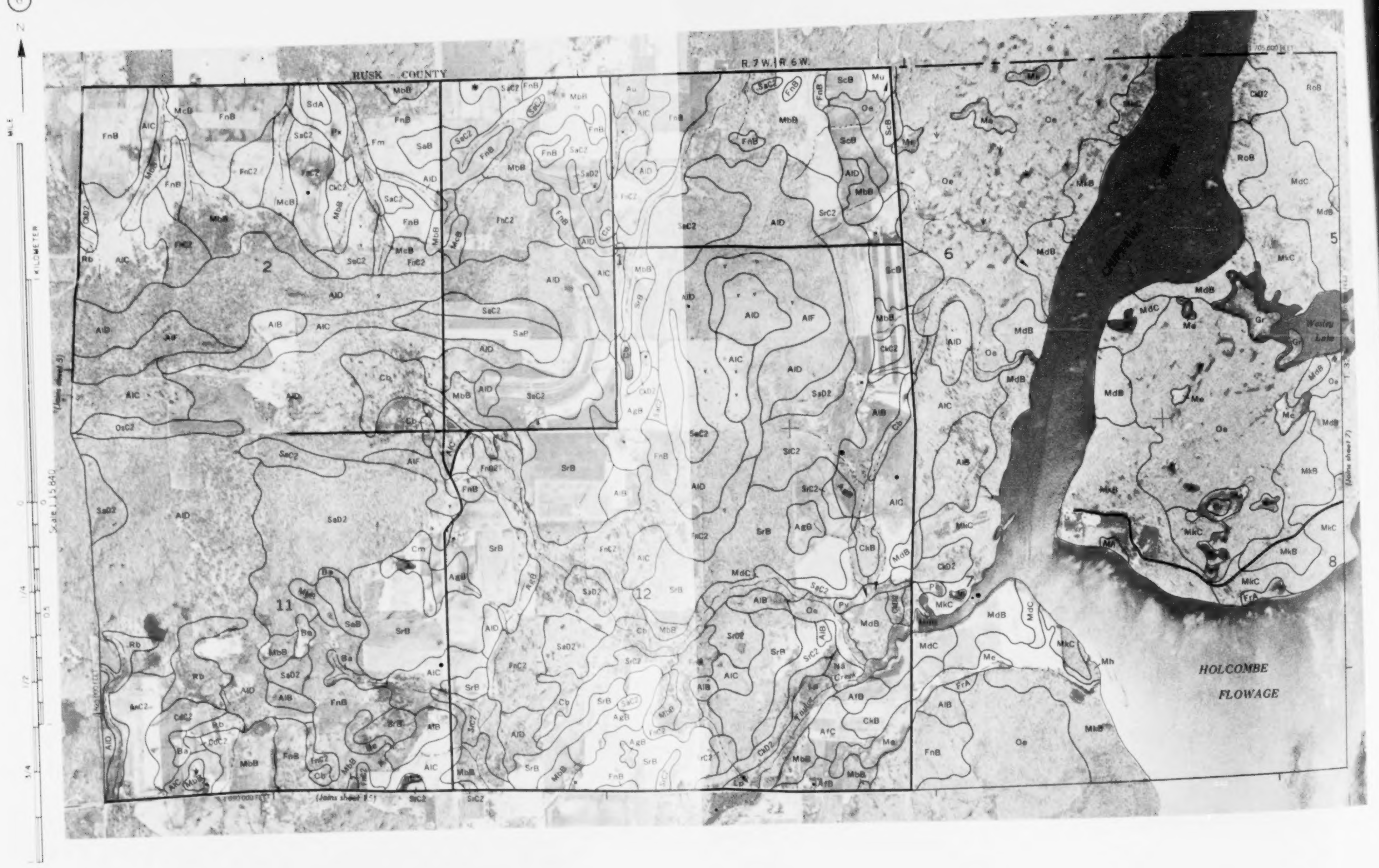
SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 6


N
RUSK COUNTY
R.7W. | R.6W.
HOLCOMBE FLOWAGE
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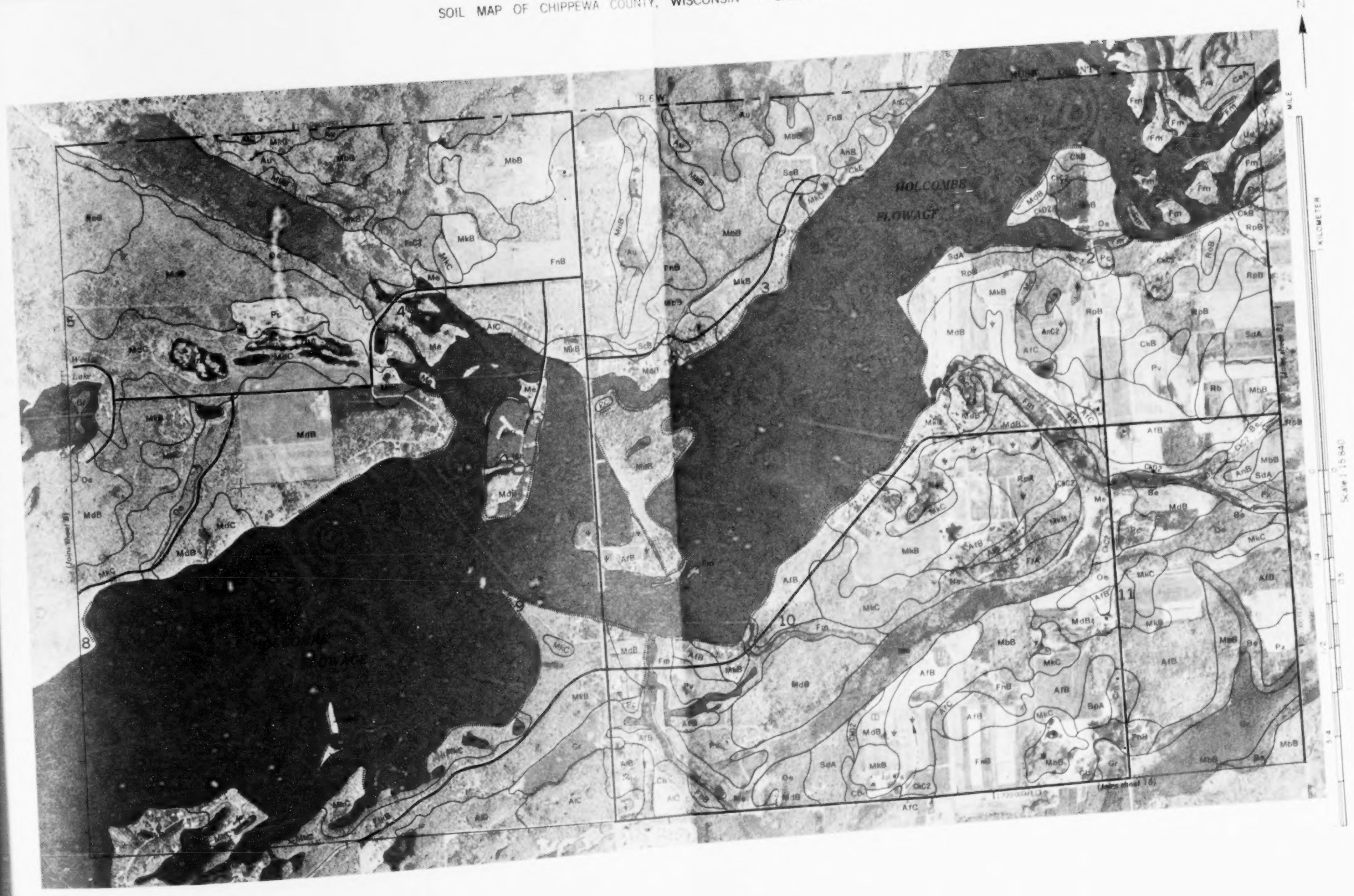
SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 7


N
HOLCOMBE FLOWAGE
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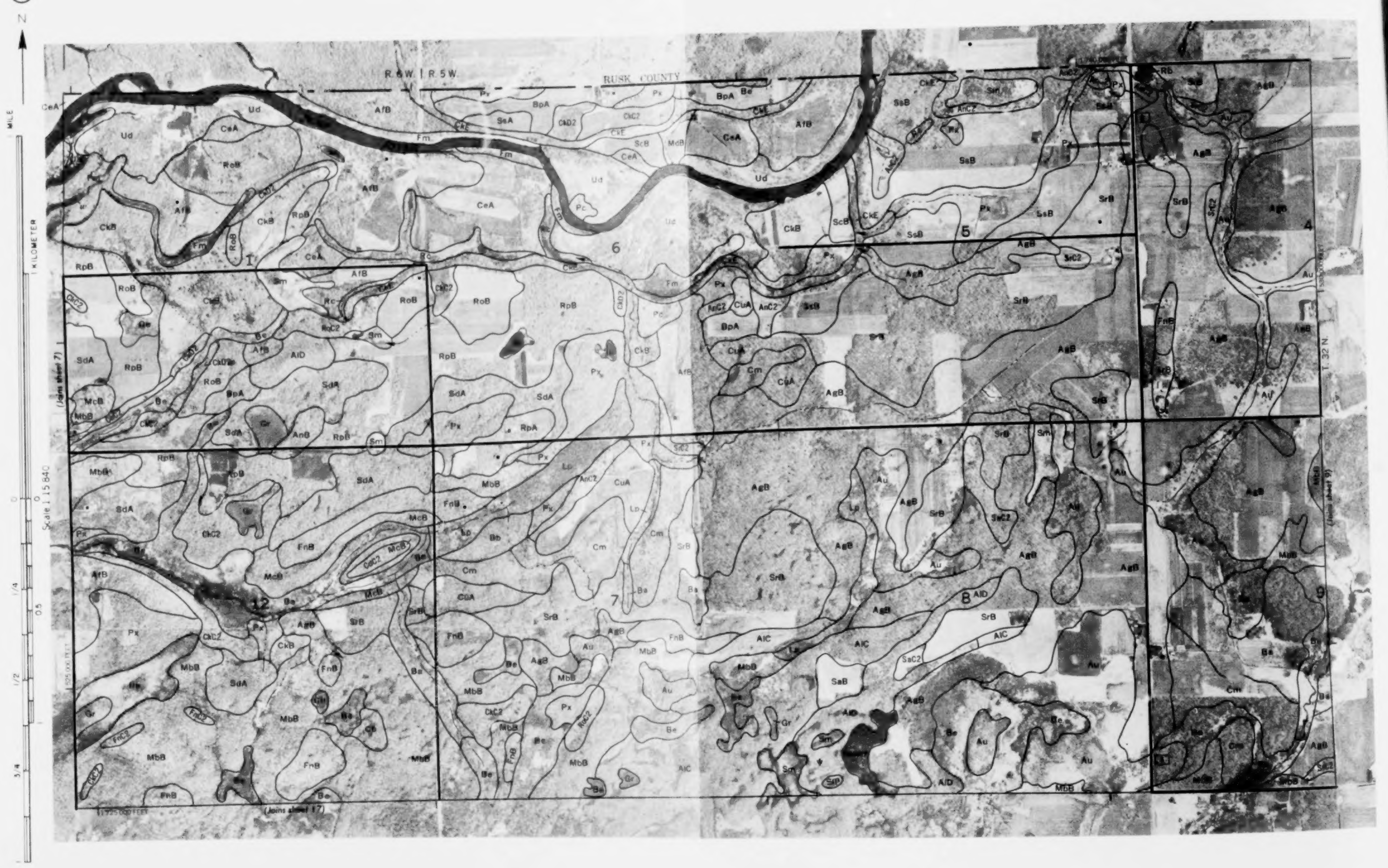
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R 8 W T 31 N
BURK COUNTY
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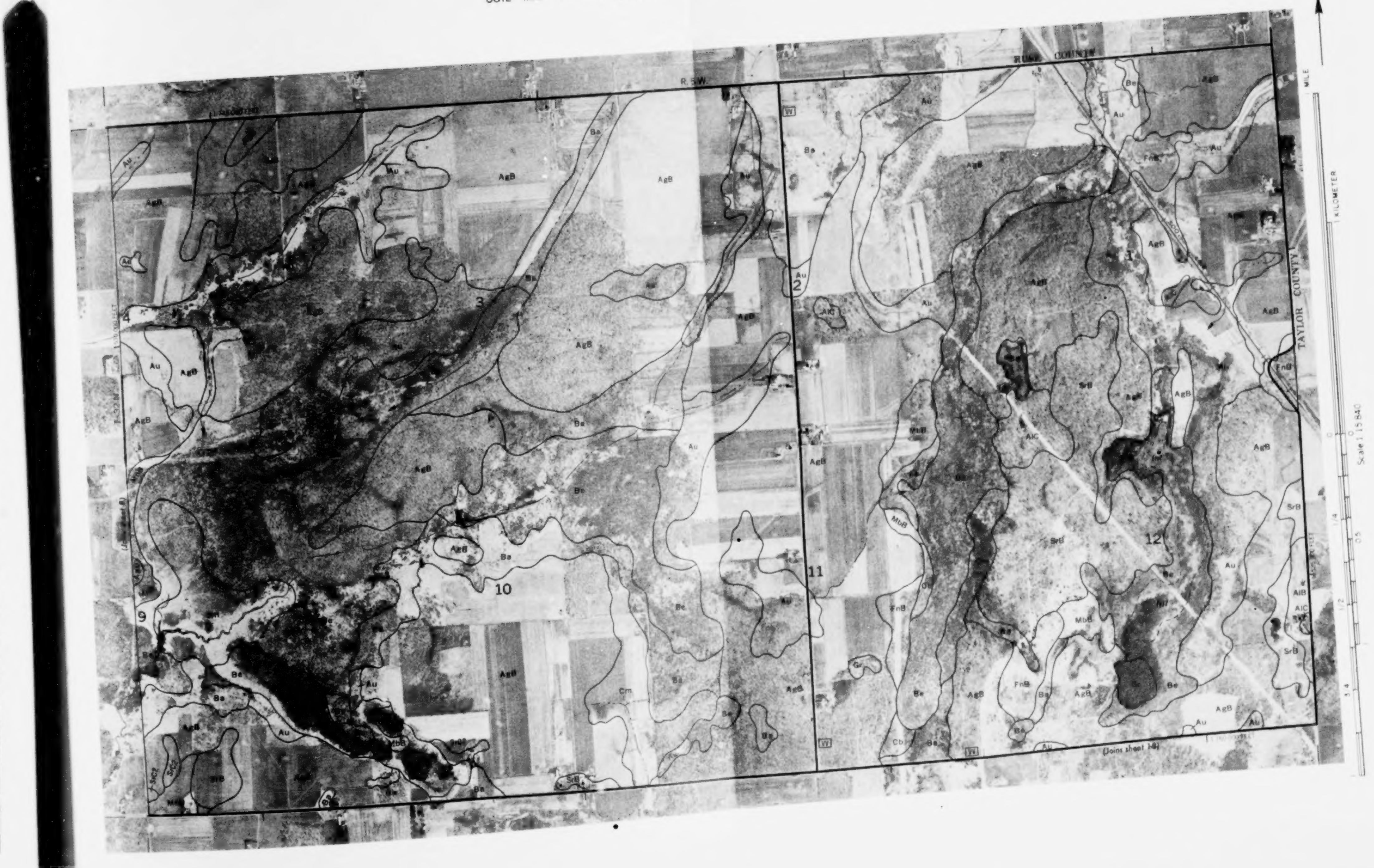
SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 9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TAYLOR COUNTY

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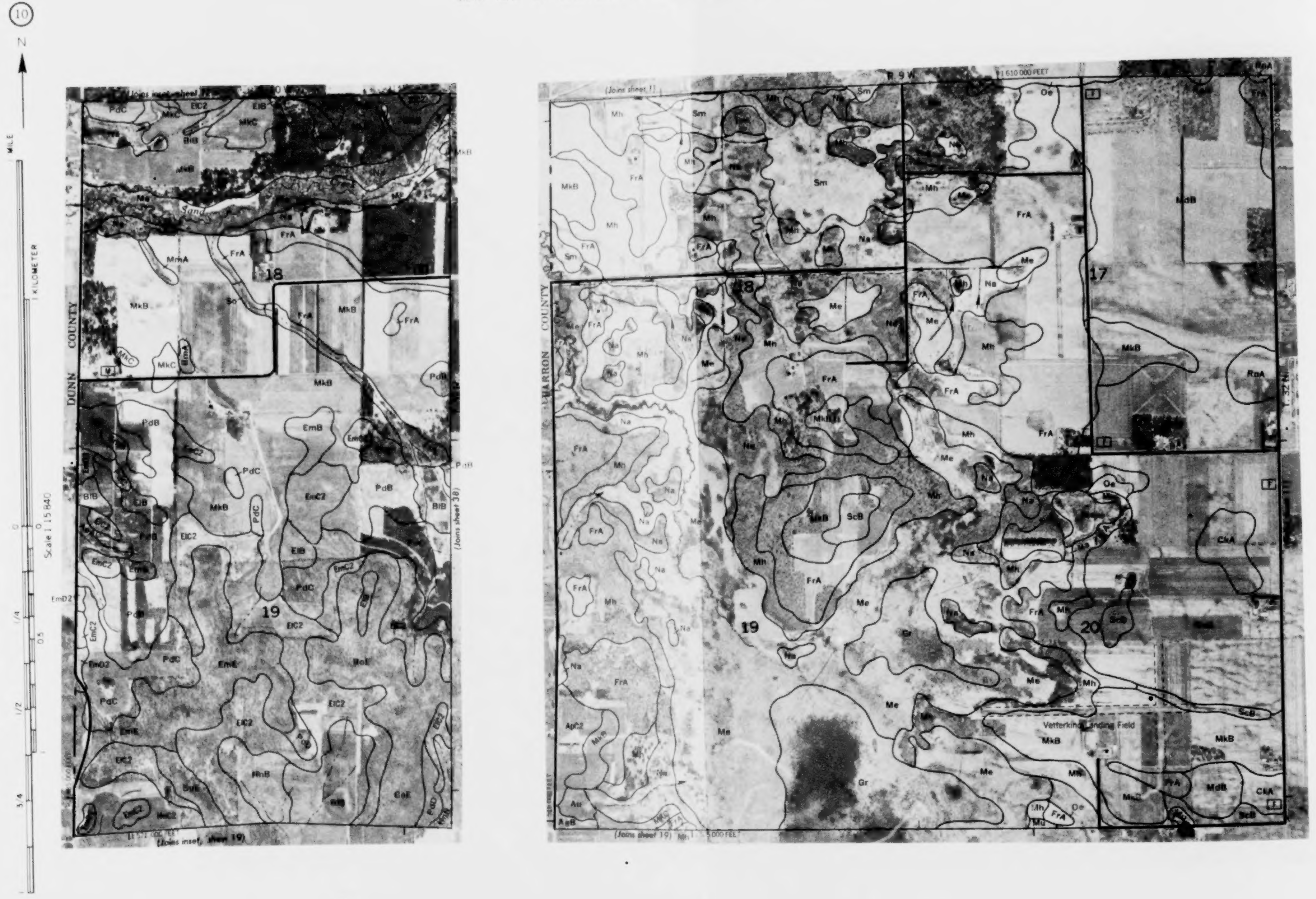
SOIL MAP OF CHIPPEWA COUNTY WISCONSIN — SHEET NUMBER 10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DUNN COUNTY
BARRON COUNTY
Scale 1:15 840
KILOMETER
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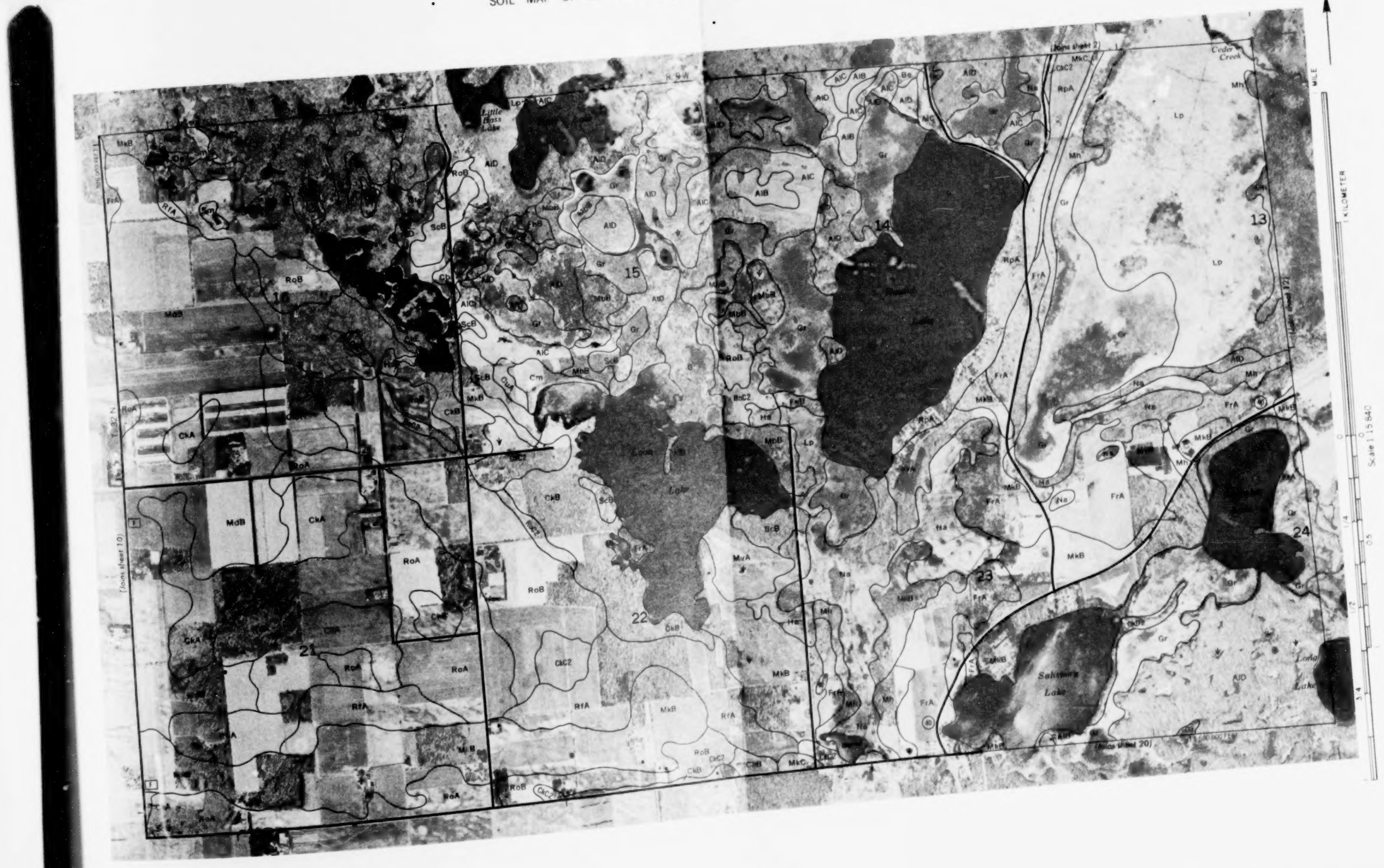
SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 11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KILOMETER
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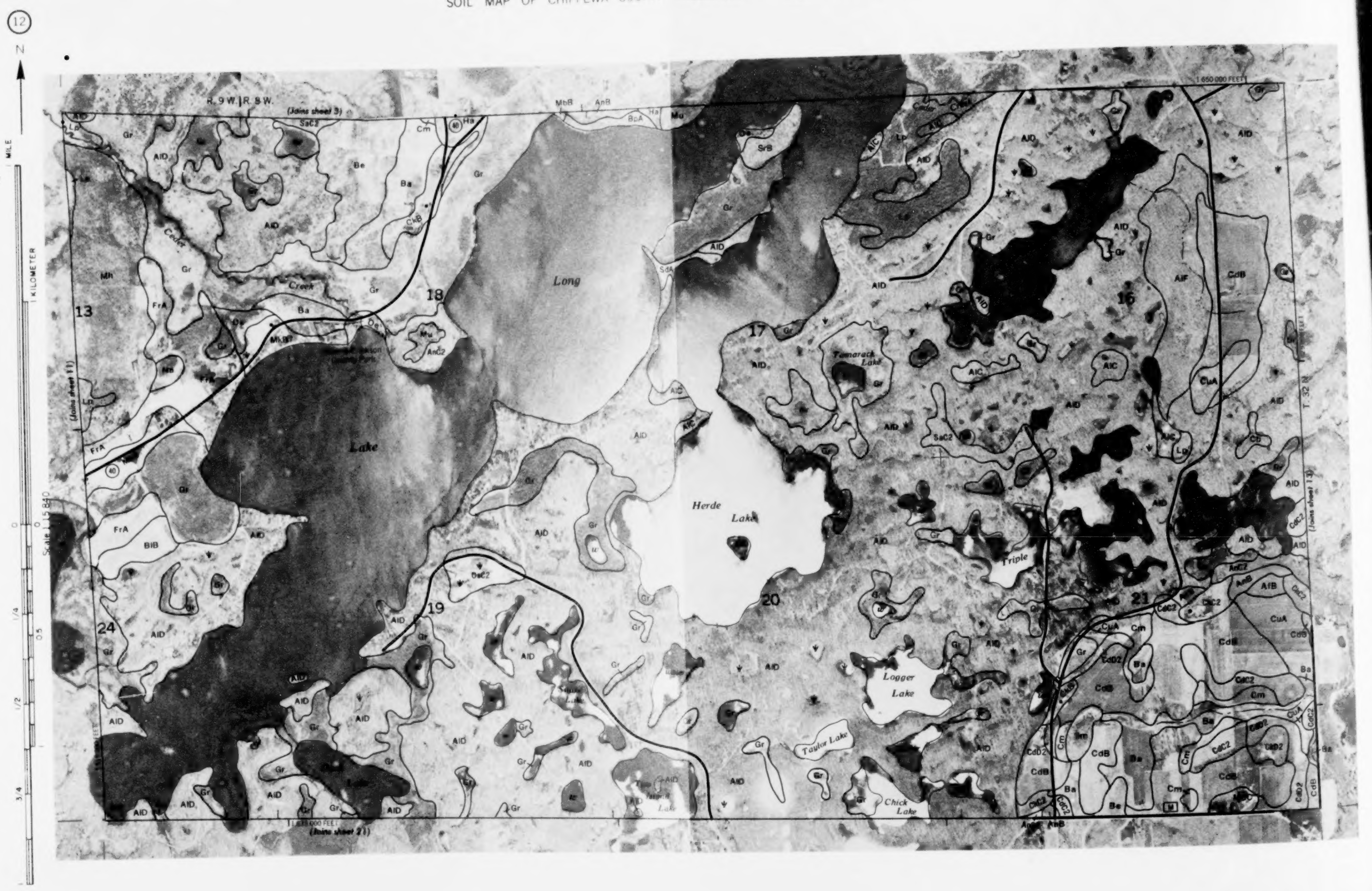
SOIL MAP OF CHIPPEWA COUNTY WISCONSIN — SHEET NUMBER 12


12
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Long
Lake
Herde Lake
Logger Lake
Chick Lake
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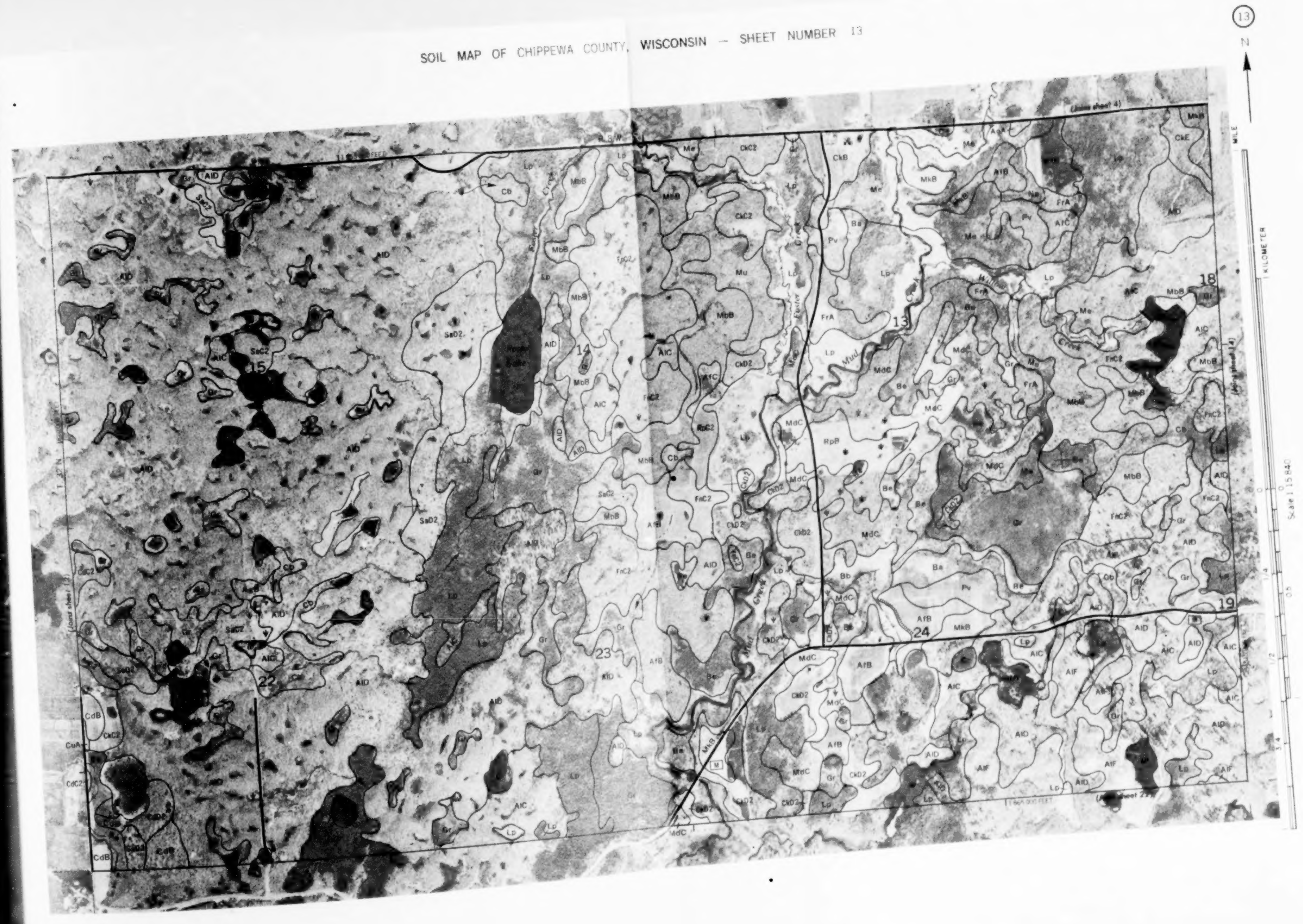
SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 13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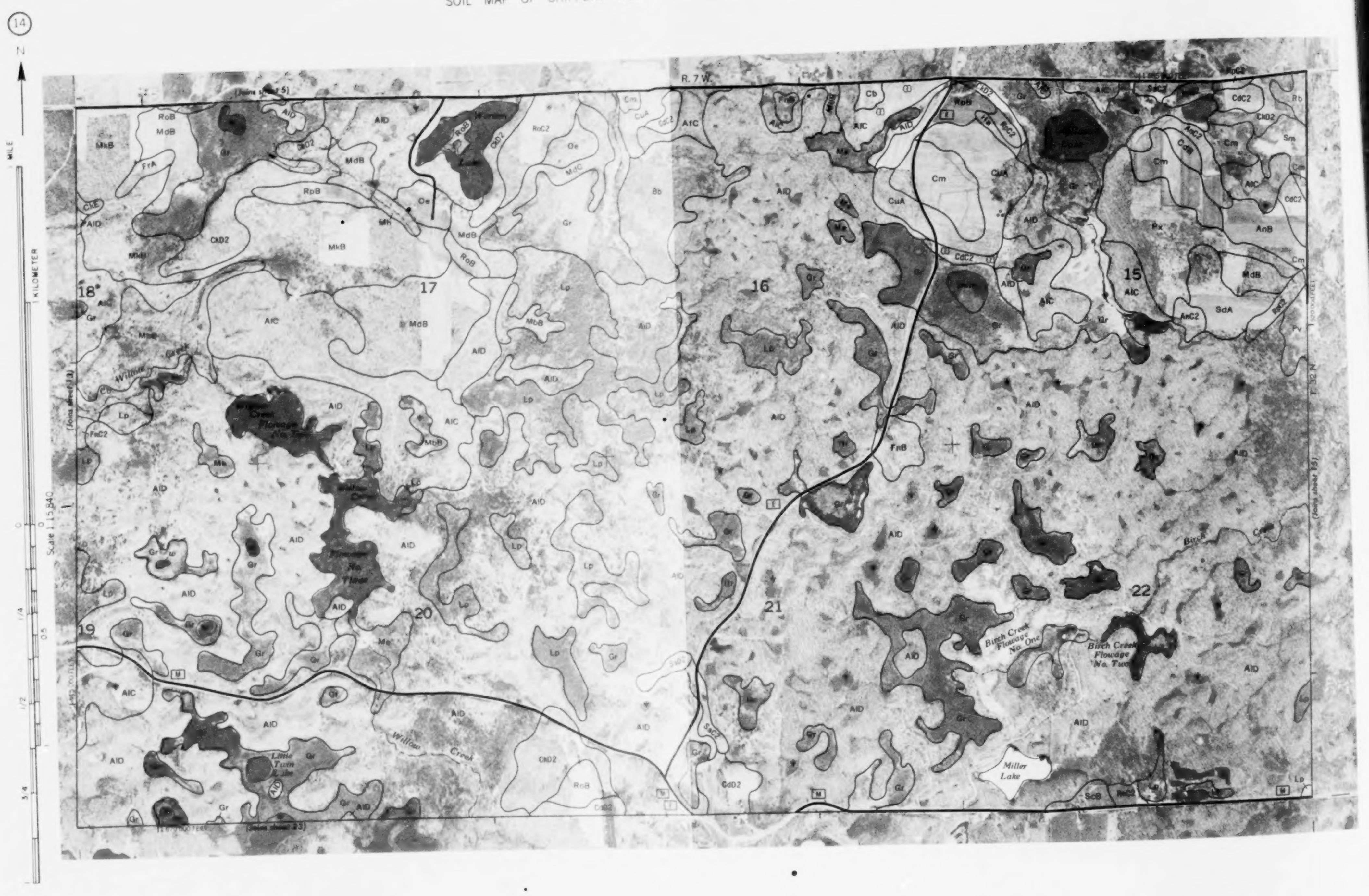
SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 14


14
N
R. 7 W.
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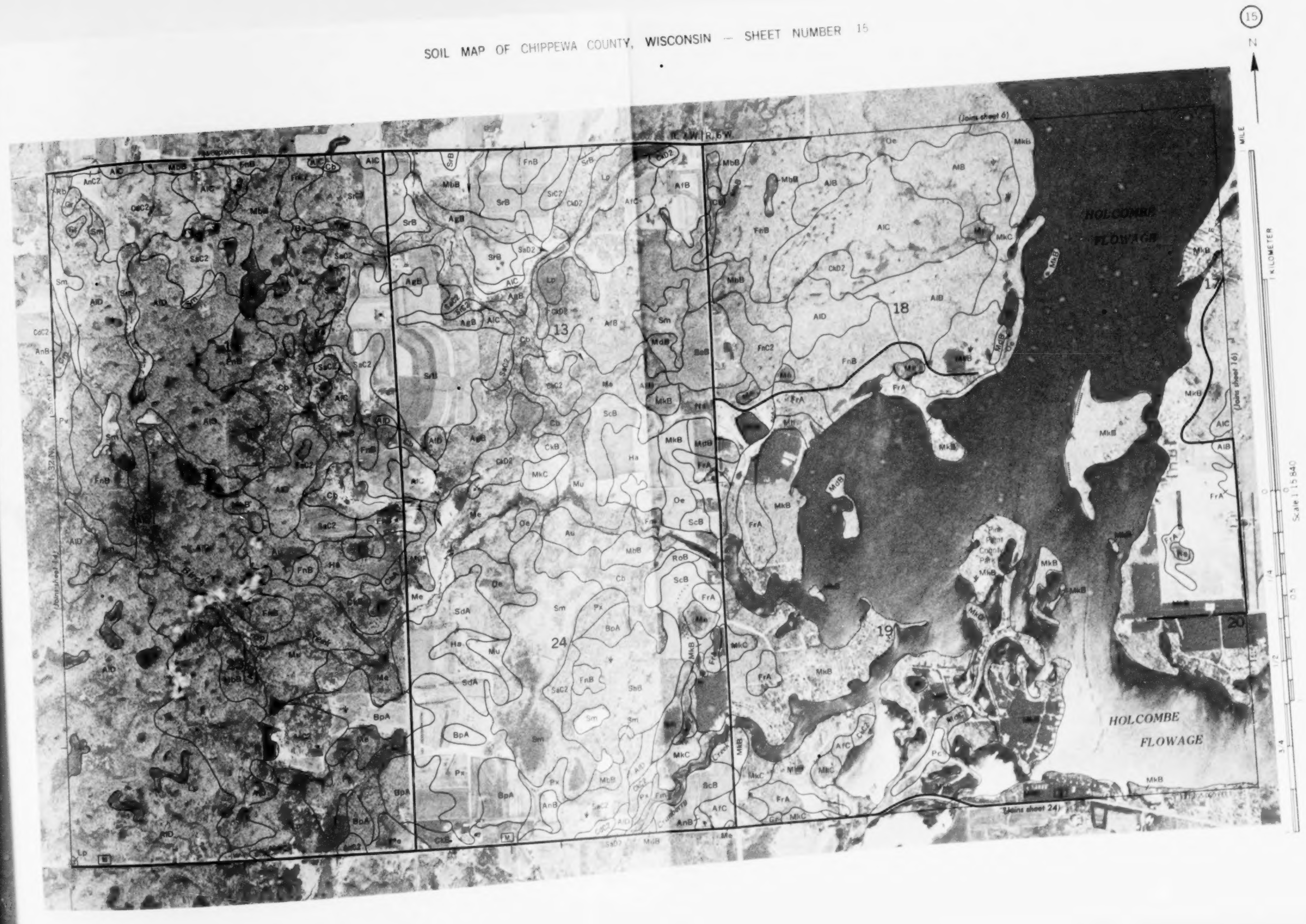
Miller Lake
Birch Creek Flowage
MILE
KILOMETER

SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 15


15
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HOLCOMBE FLOWAGE
HOLCOMBE FLOWAGE
MILE
KILOMETER

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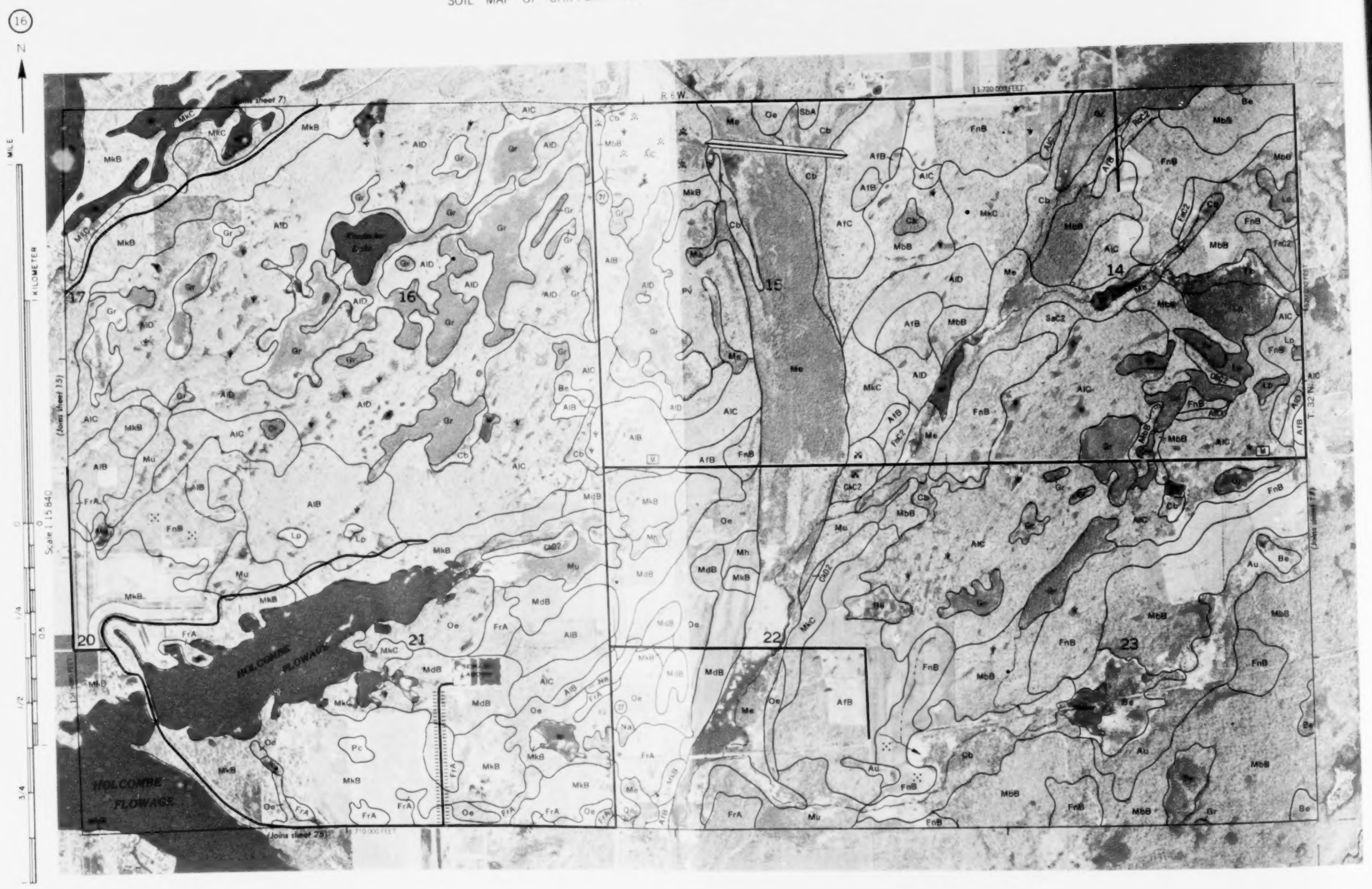
SOIL MAP OF CHIPPEWA COUNTY WISCONSIN — SHEET NUMBER 16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MILE
KILOMETER
Scale 1:15 840
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HOLCOMBE FLOWAGE

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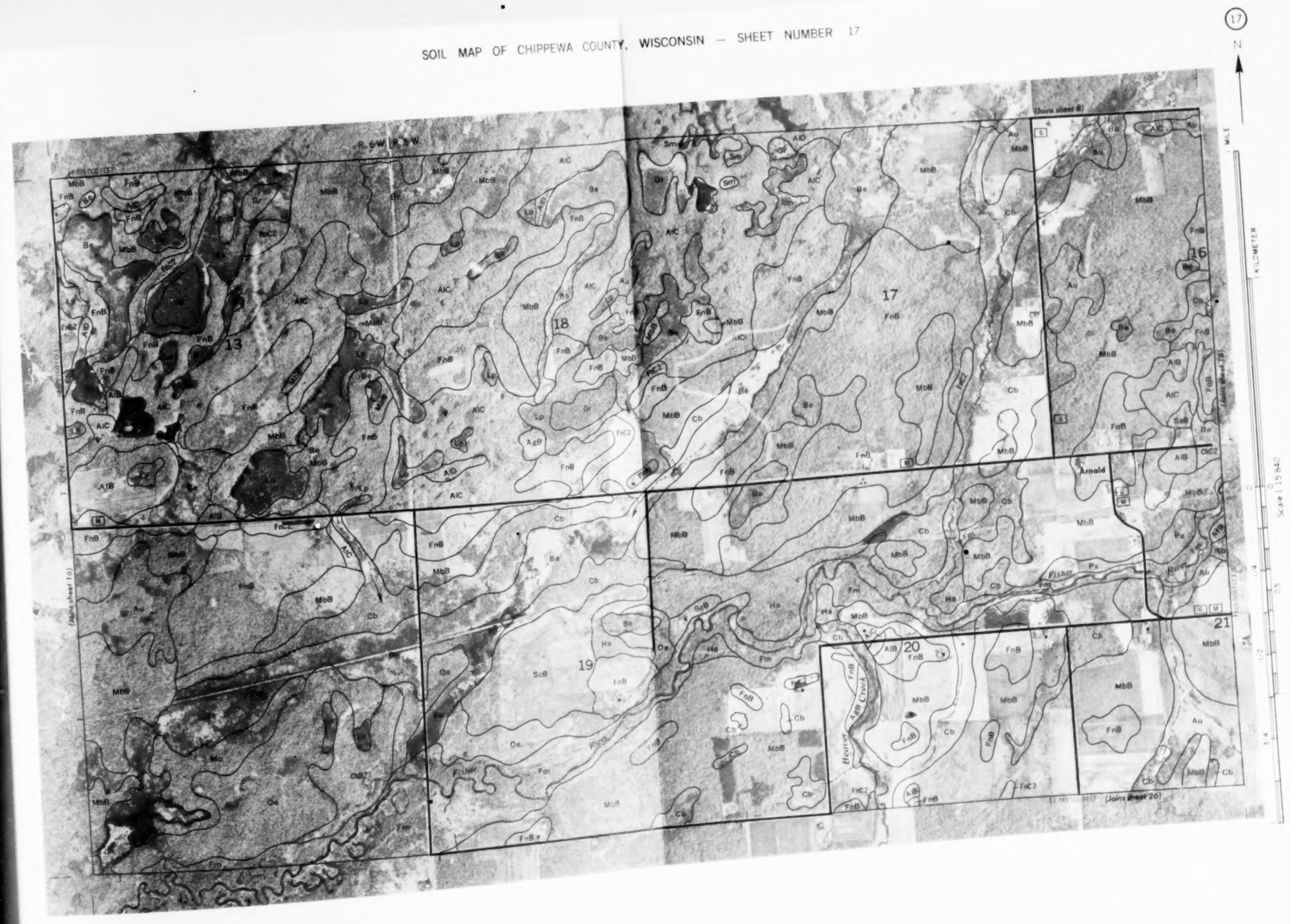
SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 17


N
MILE
KILOMETER
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Arnold

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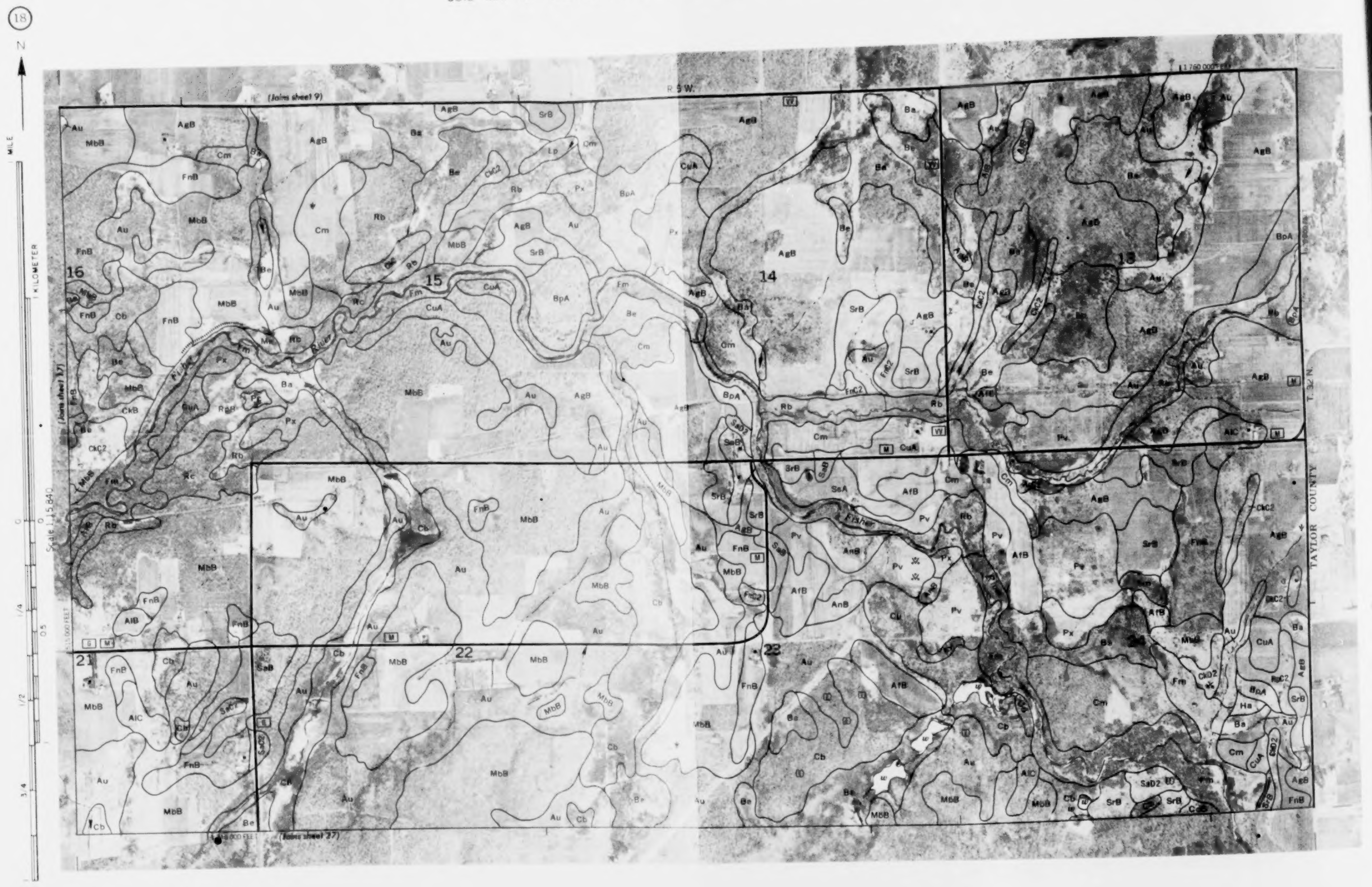
⑱

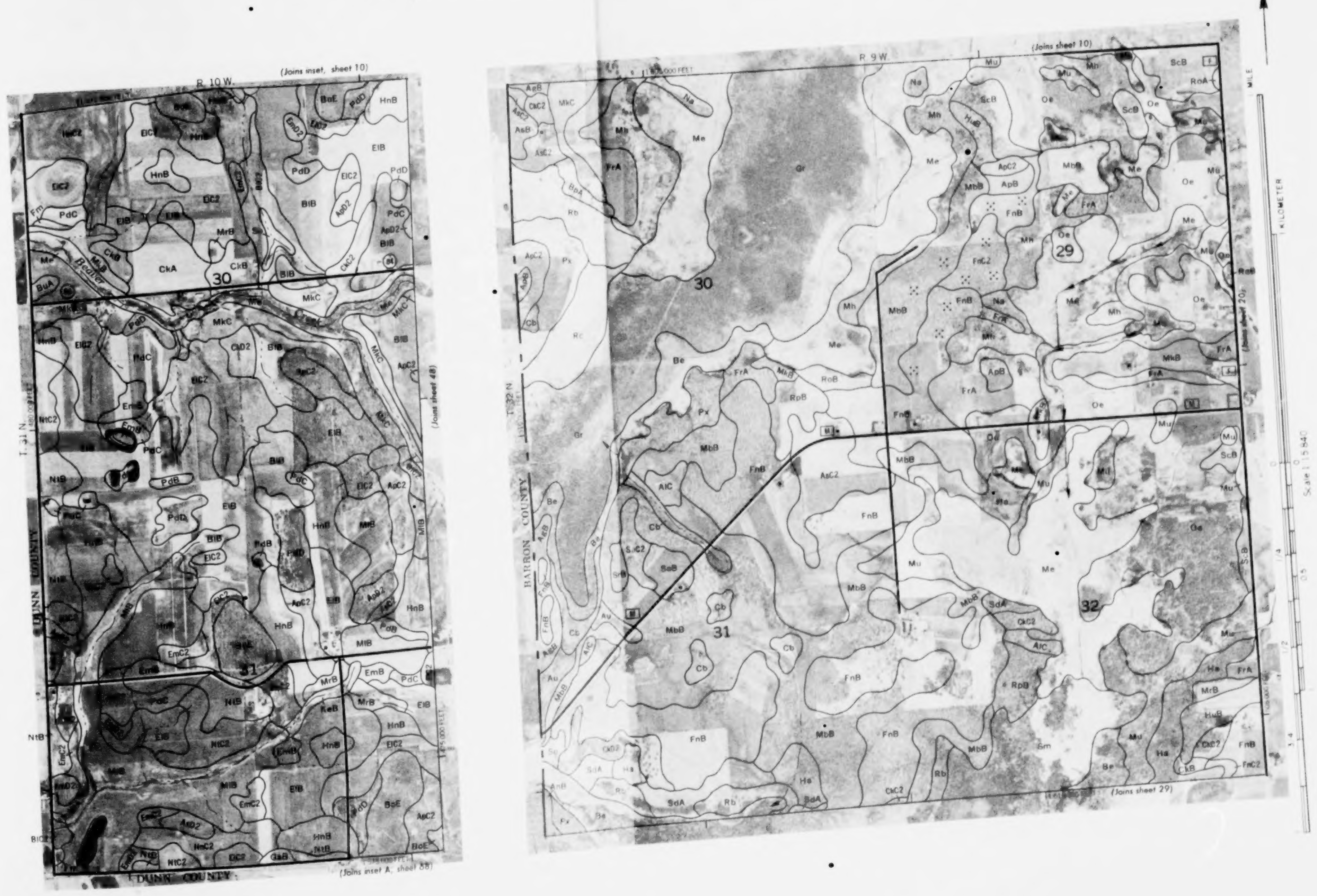
SOIL MAP OF CHIPPEWA COUNTY WISCONSIN — SHEET NUMBER 18



N
R. 9 W.
(Joins sheet 9)
(Joins sheet 27)
TAYLOR COUNTY

⑲

SOIL MAP OF CHIPPEWA COUNTY WISCONSIN — SHEET NUMBER 19



N
R. 10 W.
R. 9 W.
(Joins sheet 10)
(Joins sheet 29)
DUNN COUNTY

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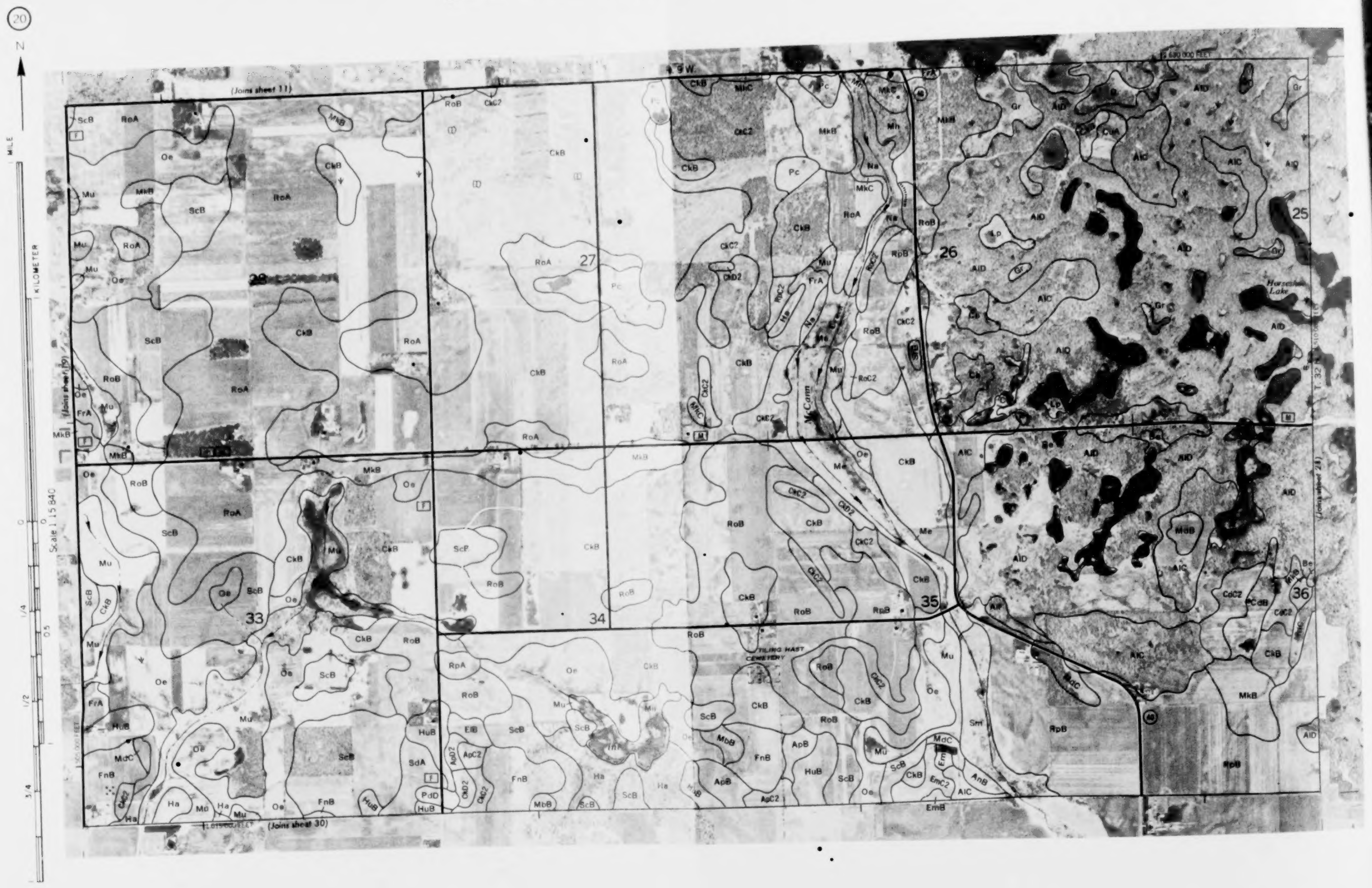
SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 20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(Joins sheet 11)
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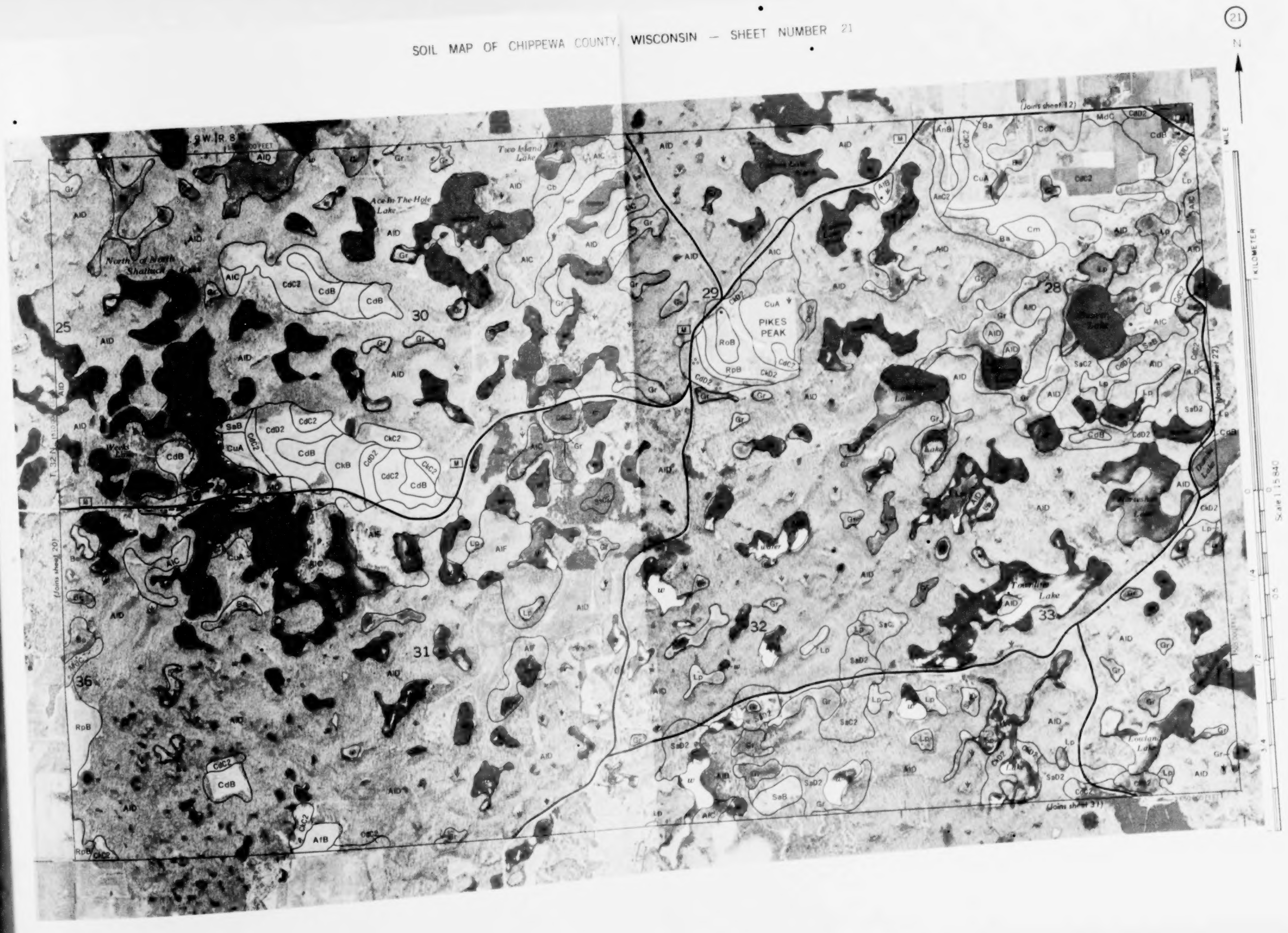
SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 21


21
N
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28
PIKES PEAK
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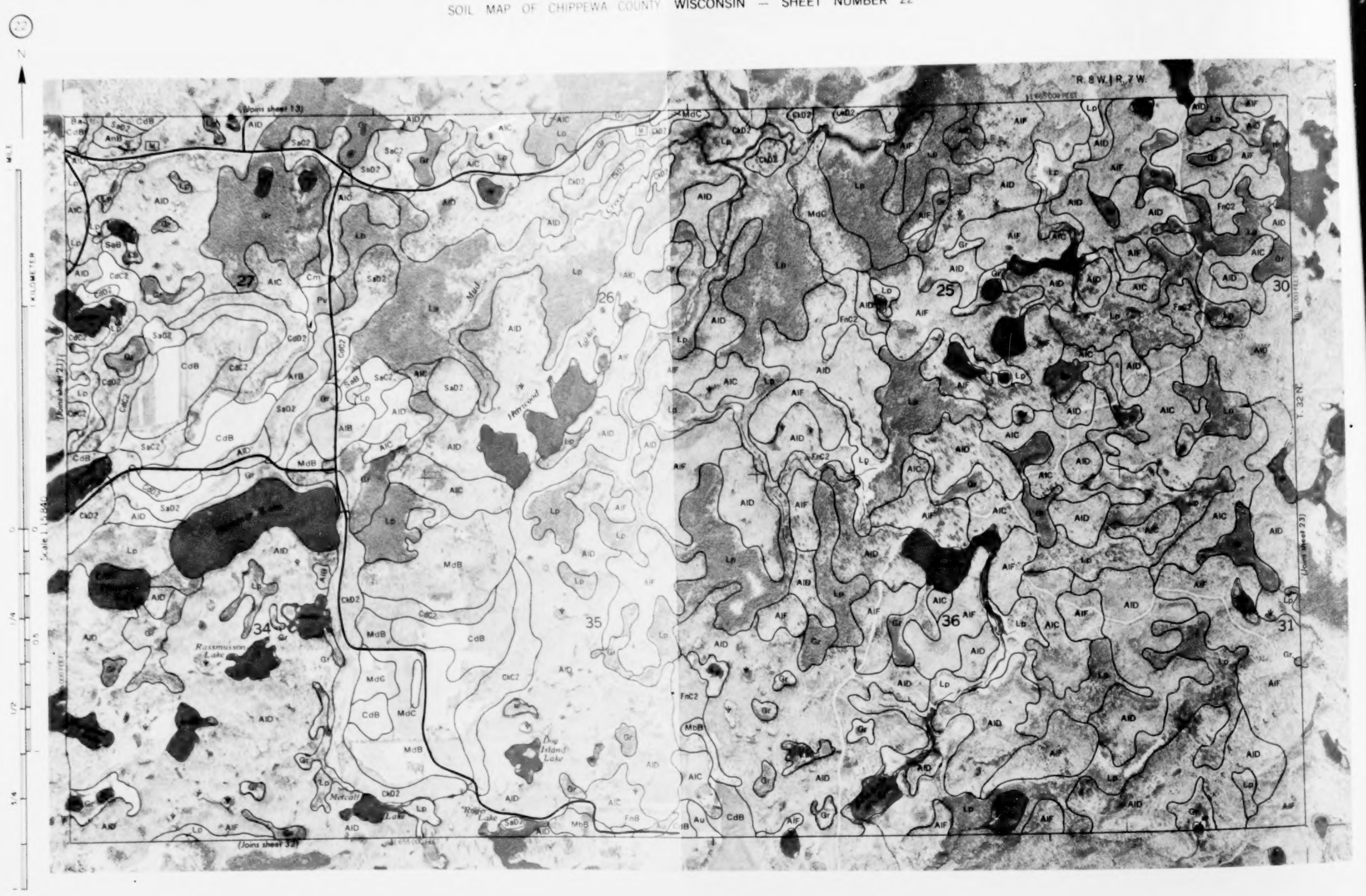
SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 22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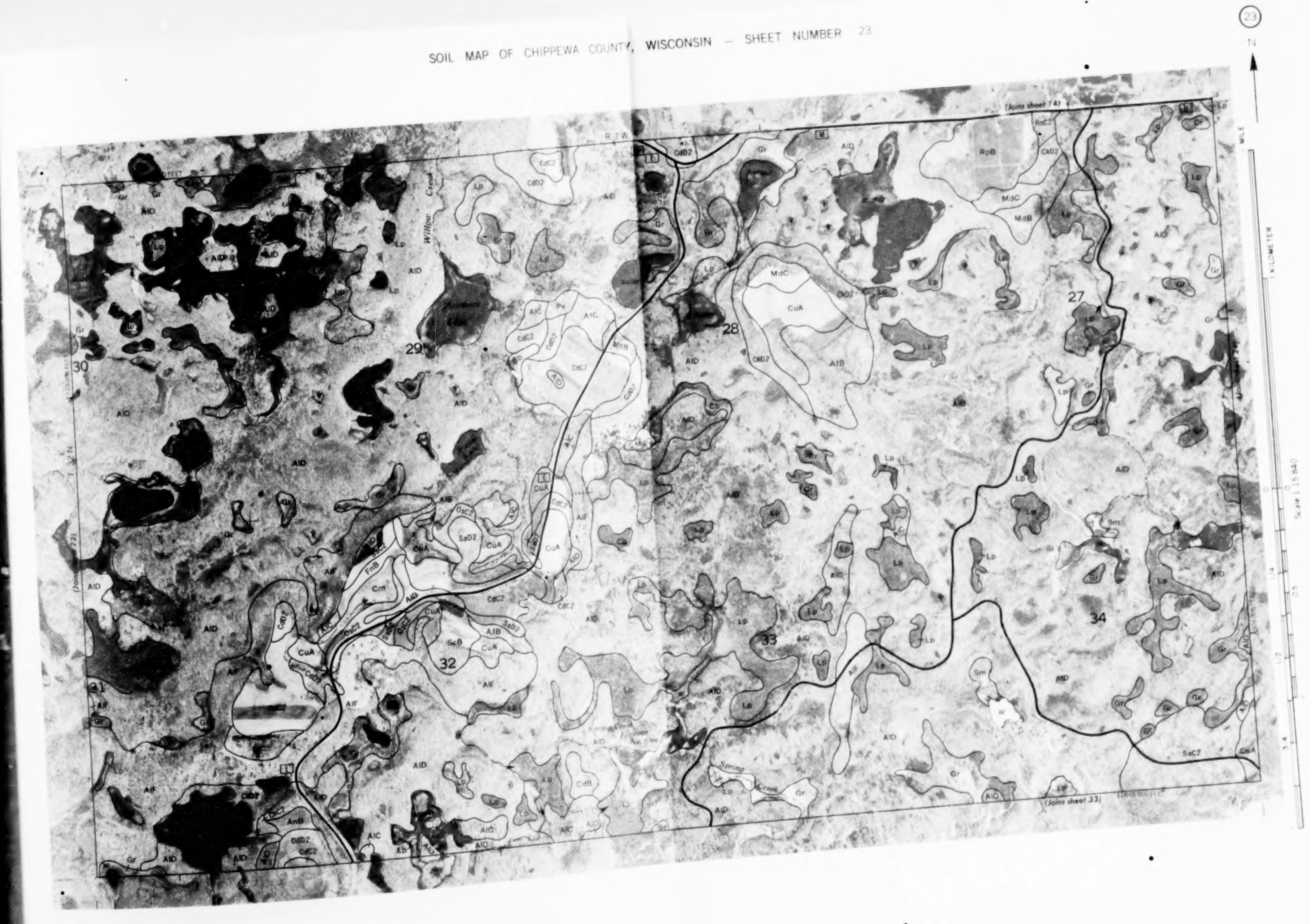
31

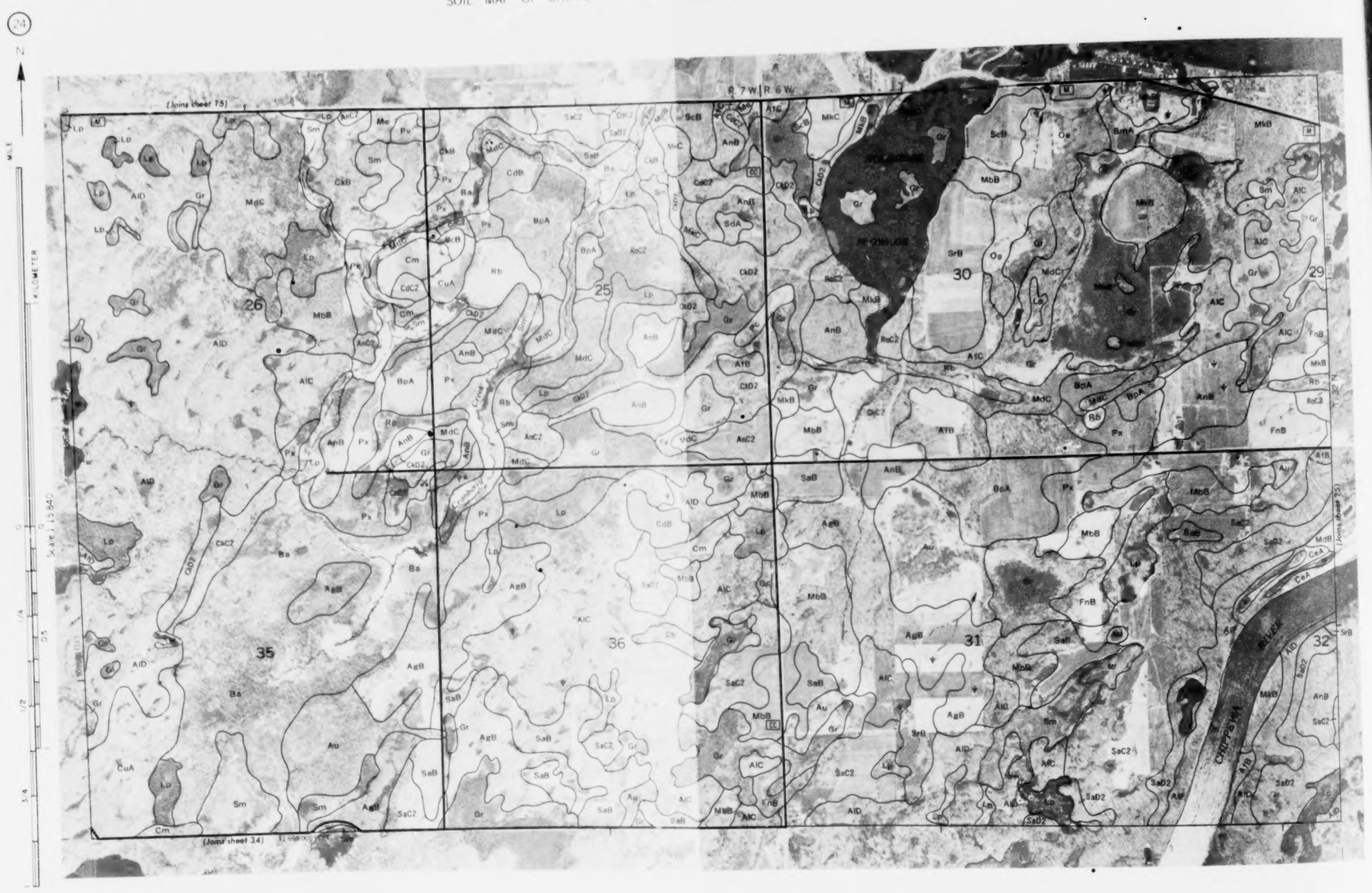
SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 23


23
N
30
29
28
27
32
33
34

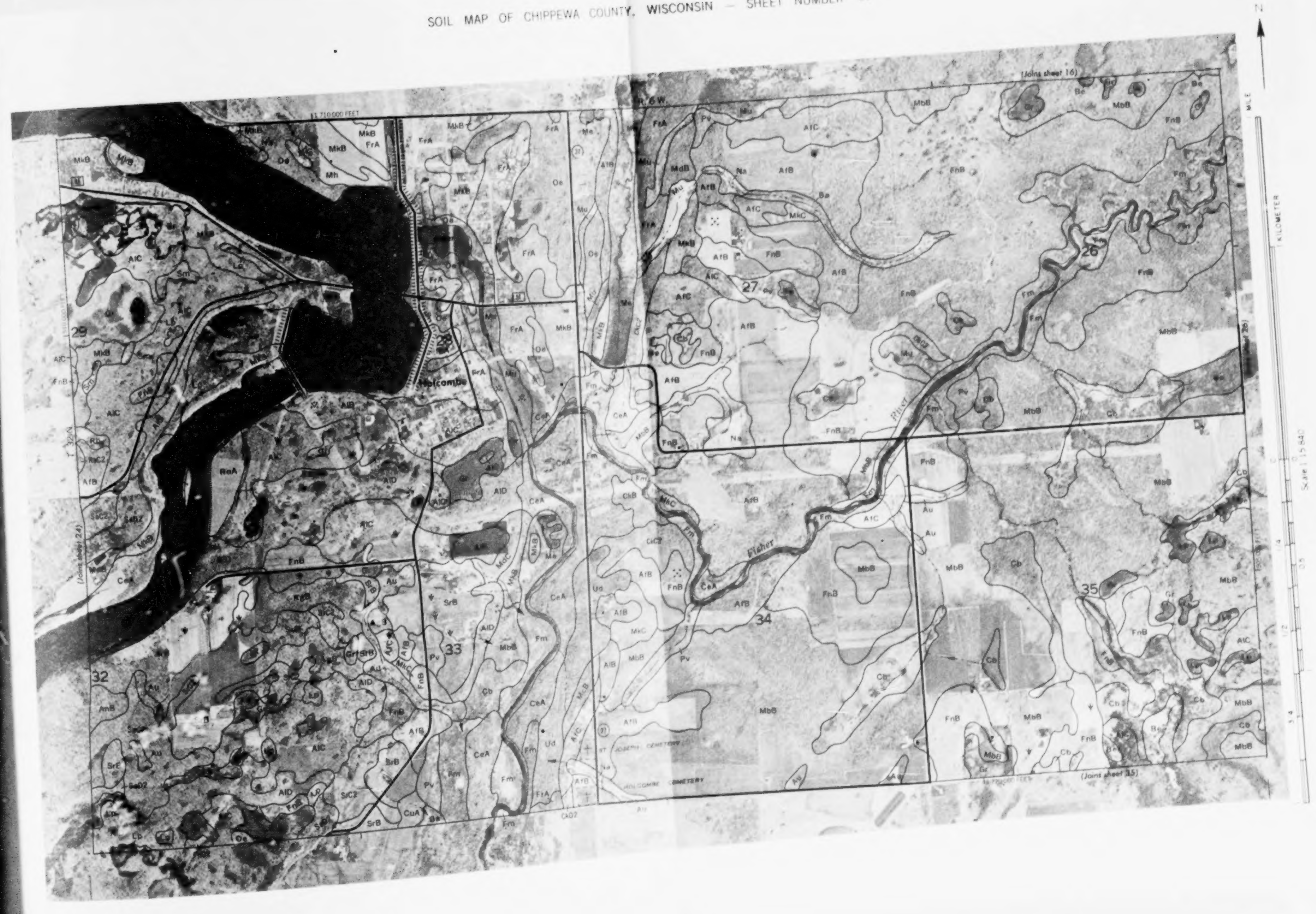
pages tightly bound

best copy available

SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 24


24
N
26
25
30
29
35
36
31
32

SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 25


25
N
28
27
26
29
33
34
35
32

pages tightly bound

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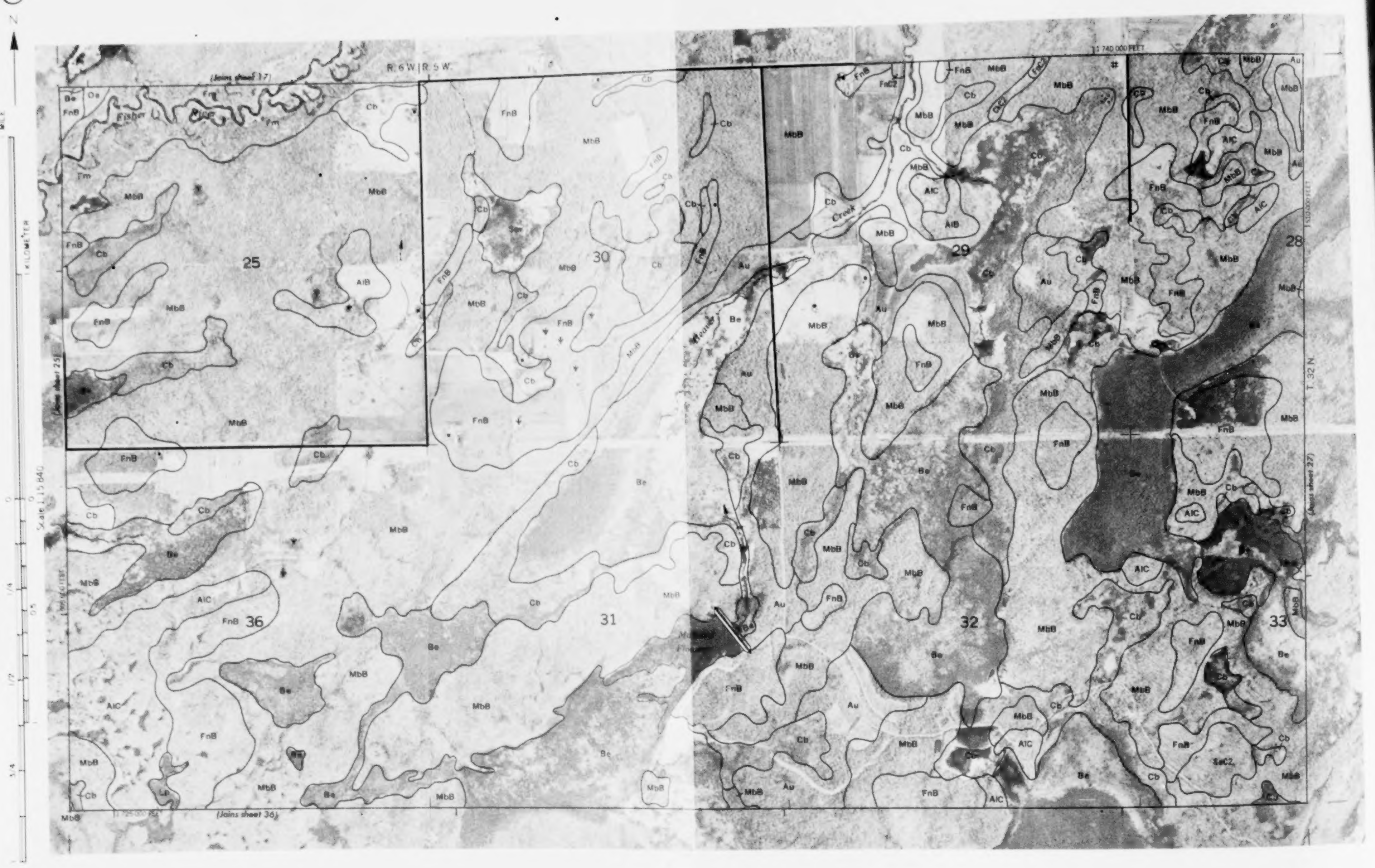
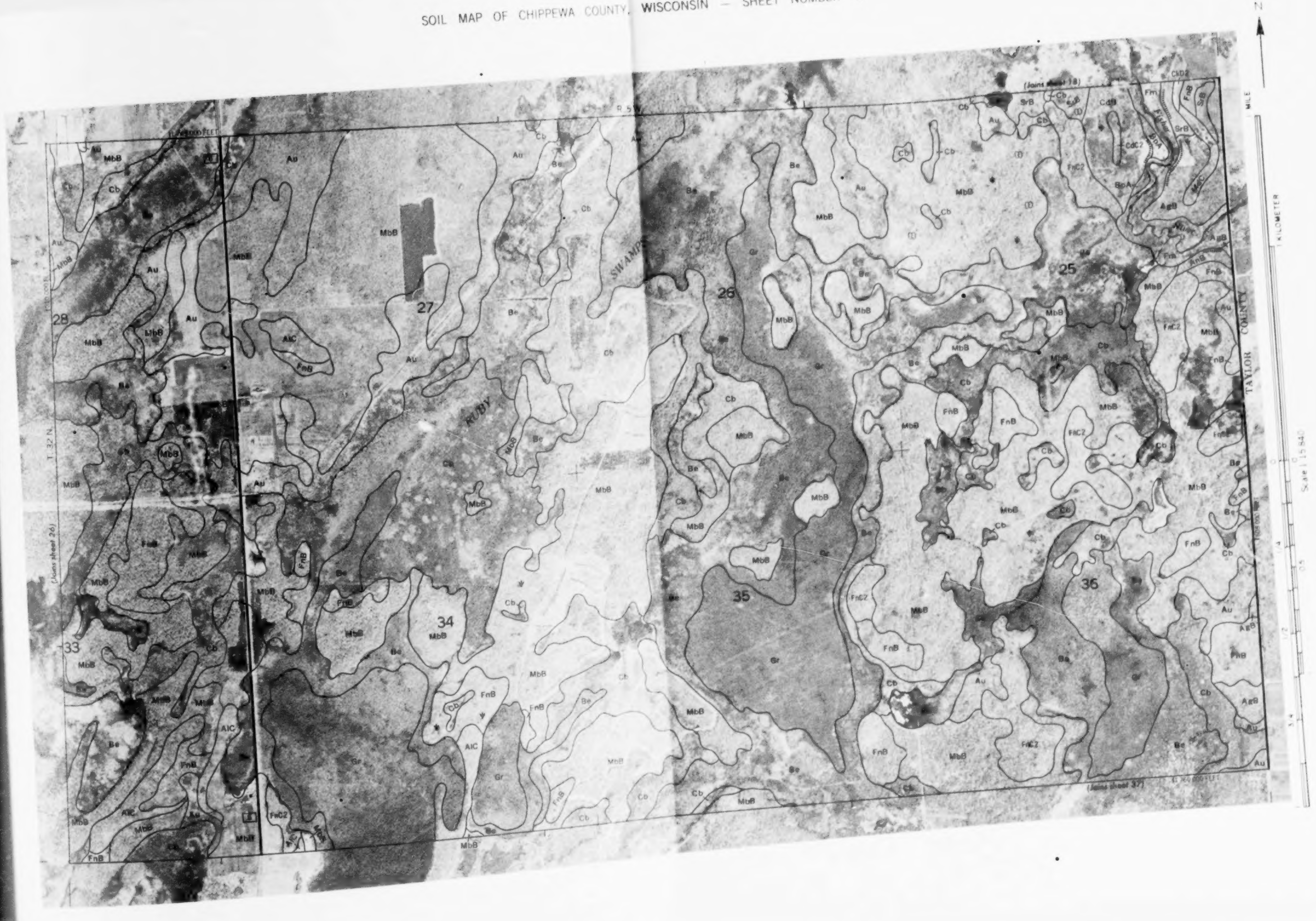
SOIL MAP OF CHIPPEWA COUNTY WISCONSIN — SHEET NUMBER 26


N
MILE
25
30
29
28
36
31
32
33
MtB
FnB
Cb
Be
AlC
Au

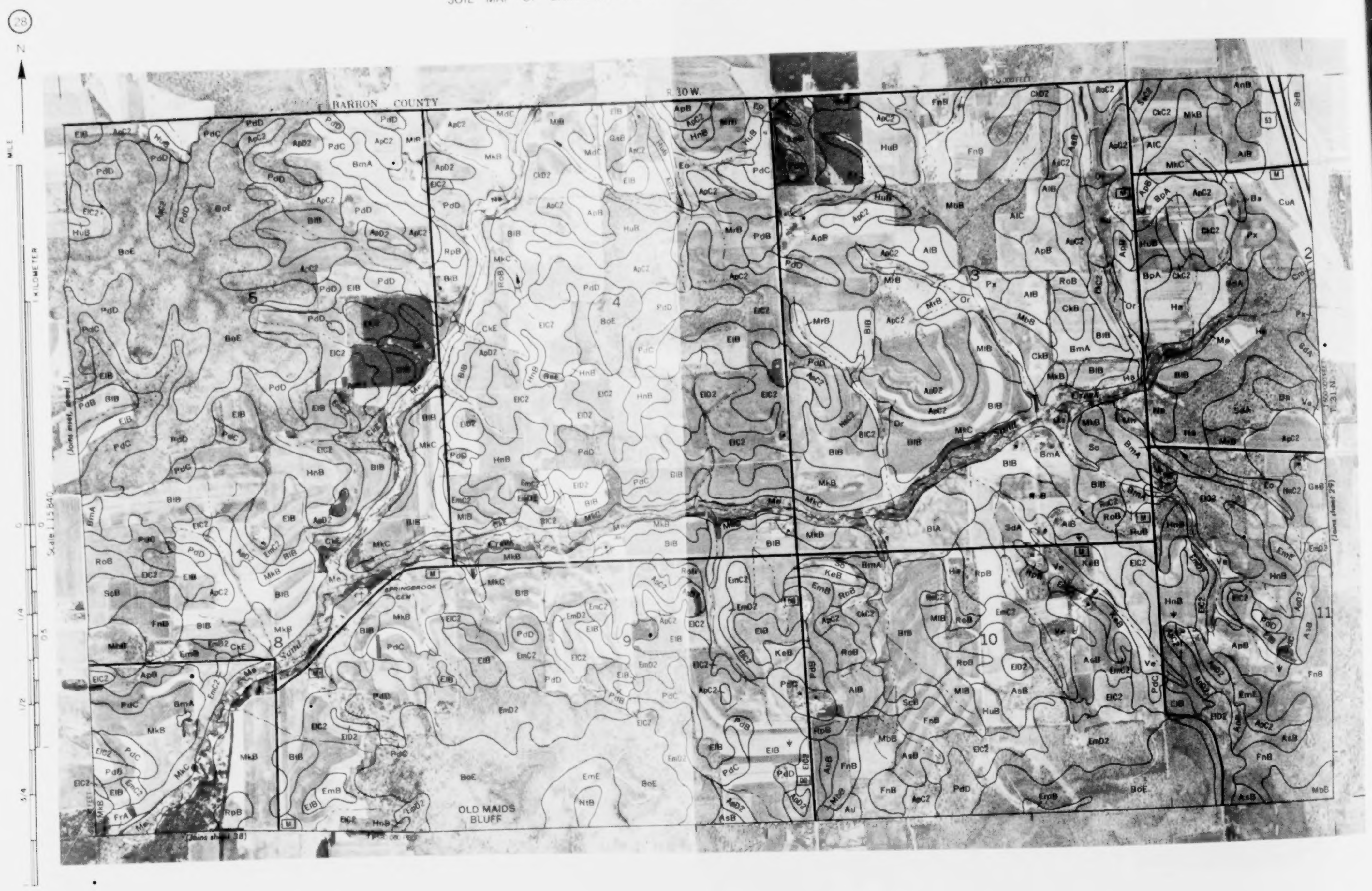
SOIL MAP OF CHIPPEWA COUNTY WISCONSIN — SHEET NUMBER 27


N
MILE
28
27
26
25
33
34
35
36
MtB
FnB
Cb
Be
AlC
Au

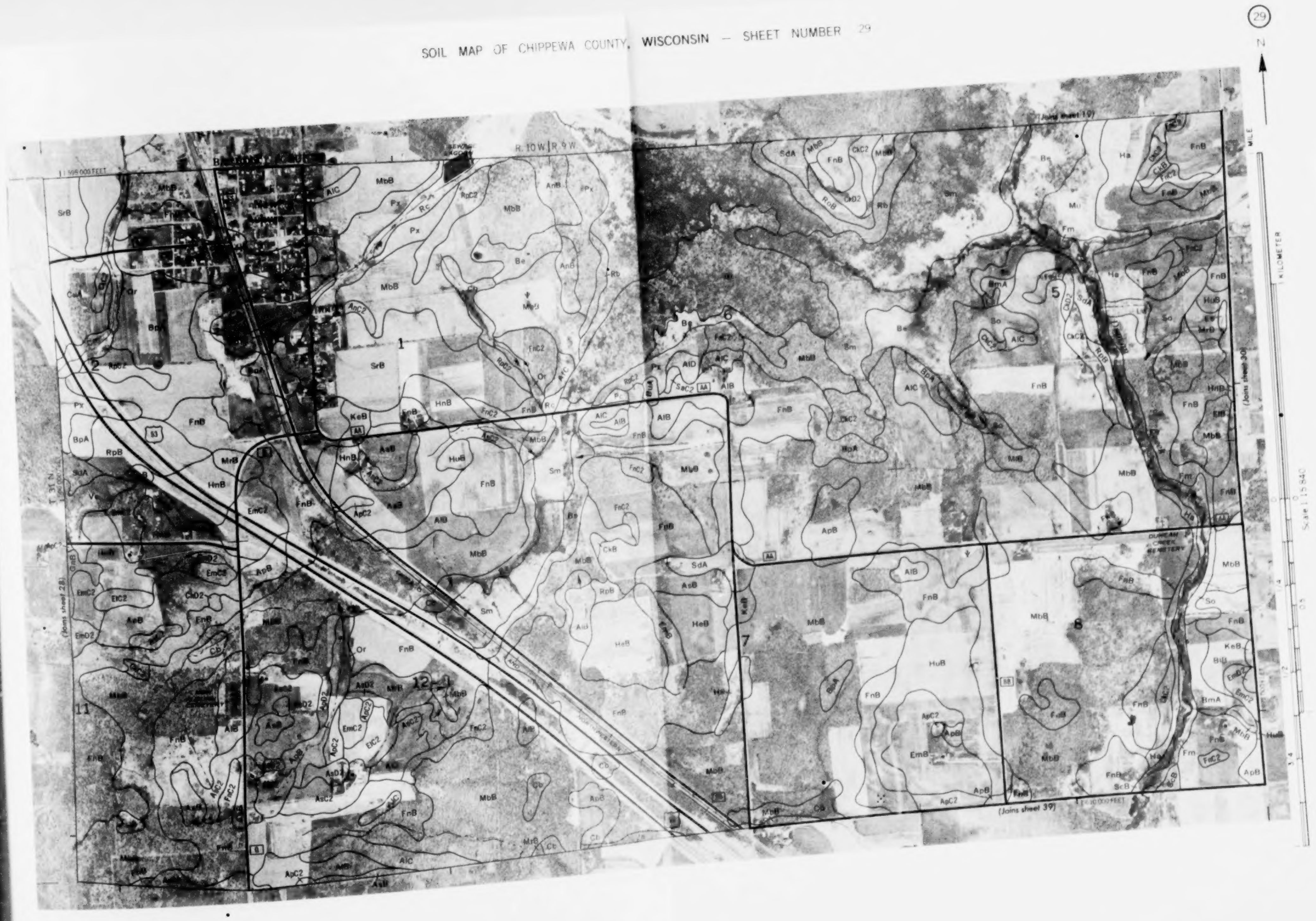
pages tightly bound

best copy available

SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 28


28
N
BARRON COUNTY
OLD MAIDS BLUFF

SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 29



pages tightly bound

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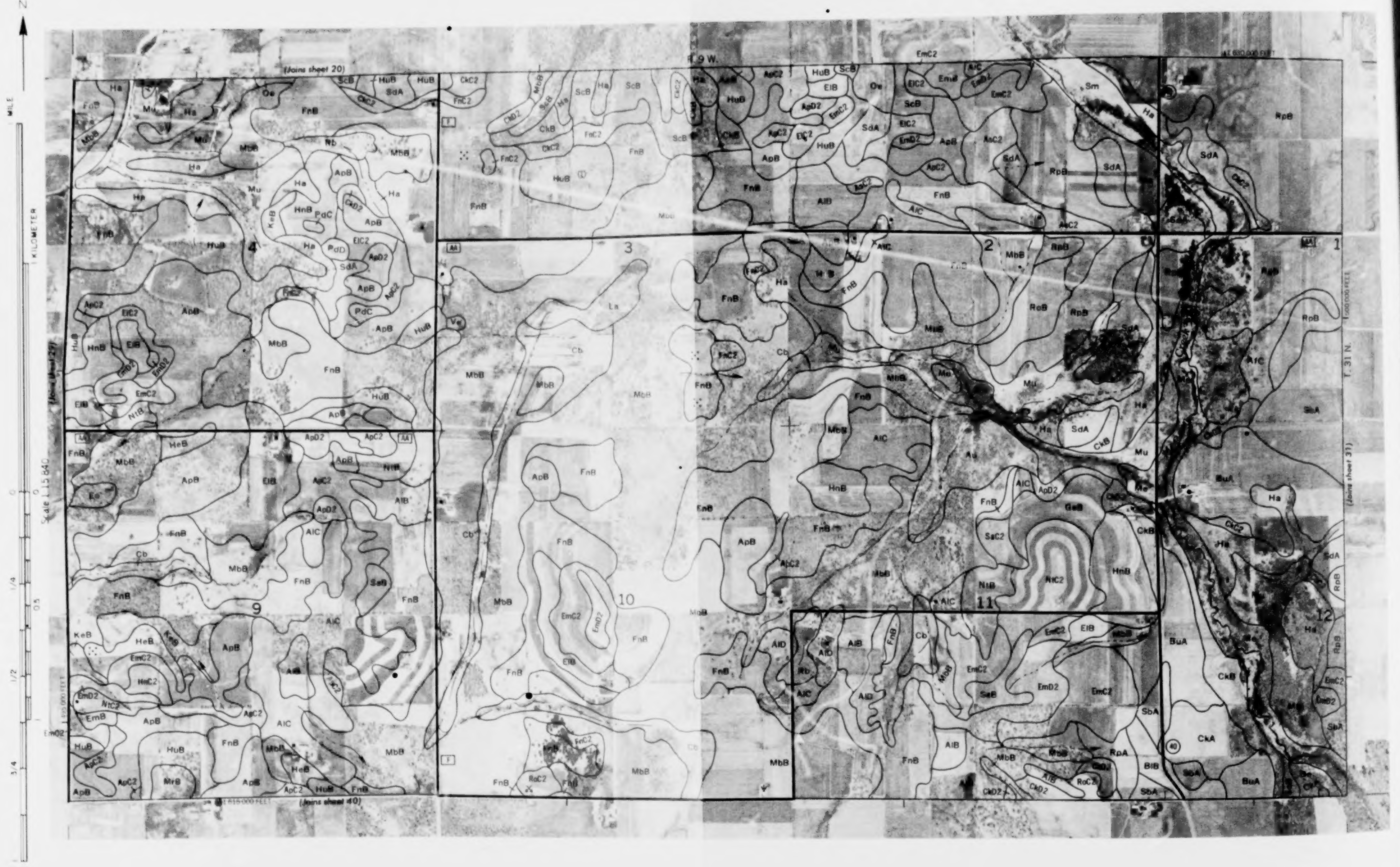
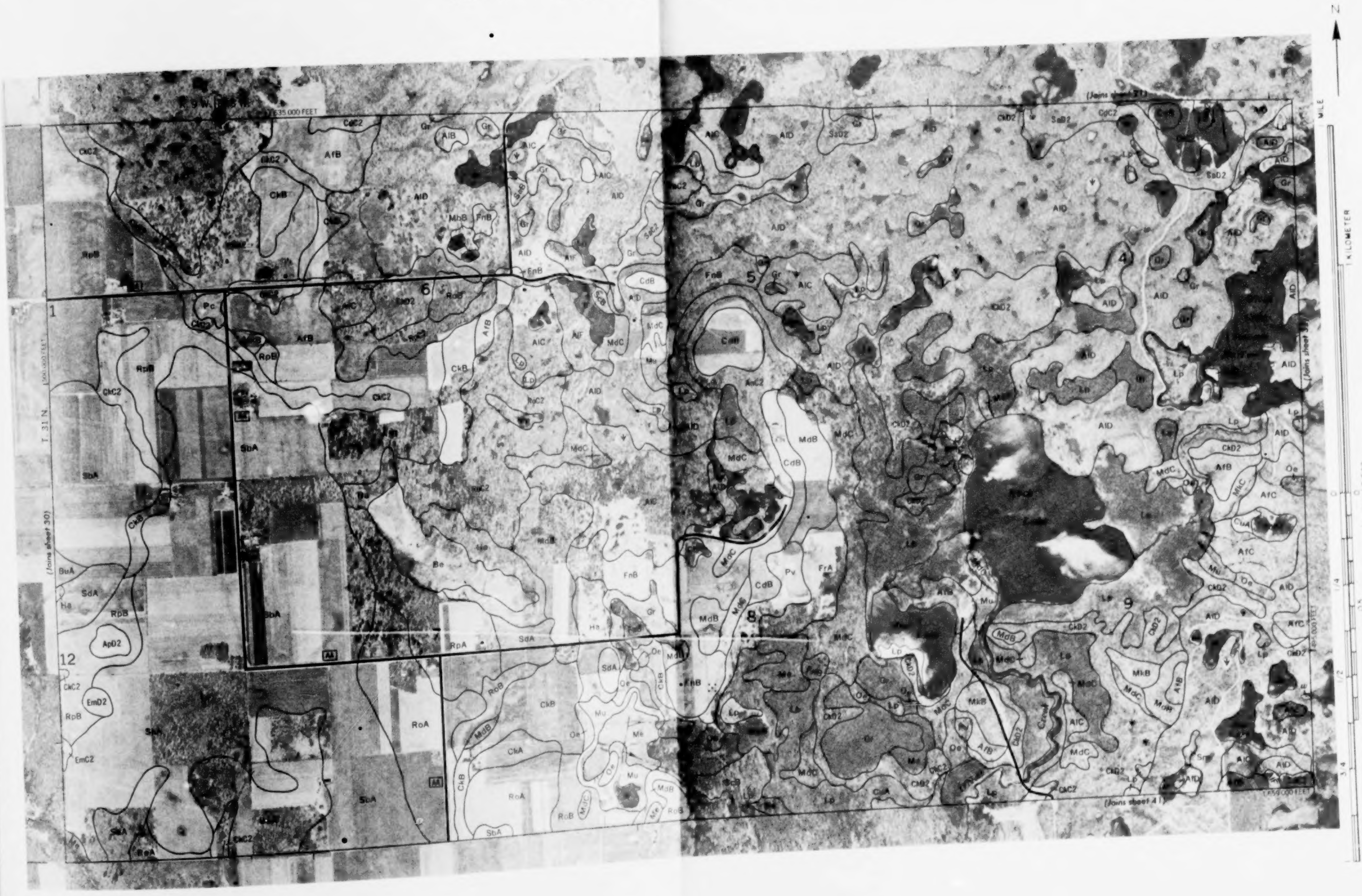
SOIL MAP OF CHIPPEWA COUNTY WISCONSIN — SHEET NUMBER 30



SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 31



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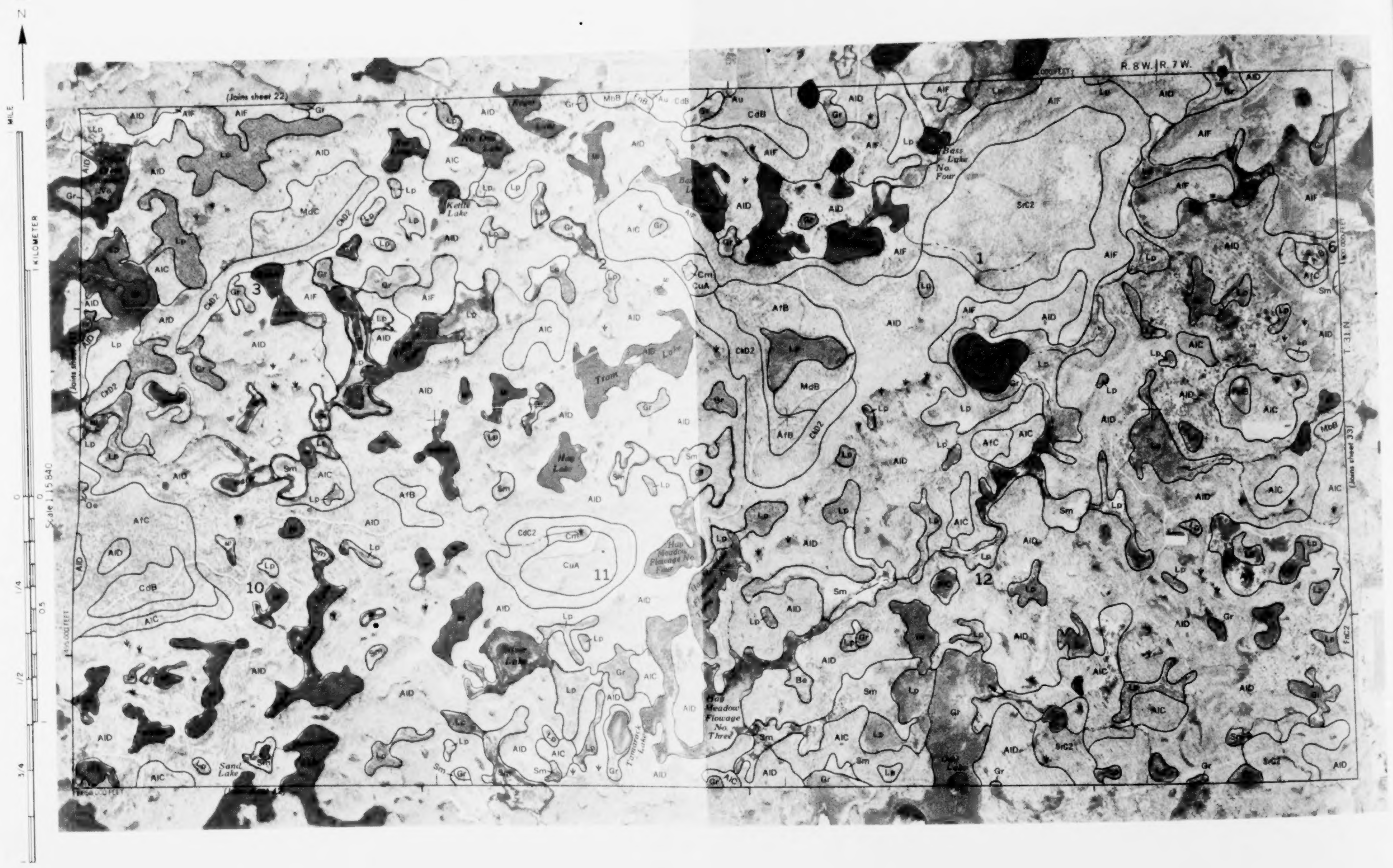
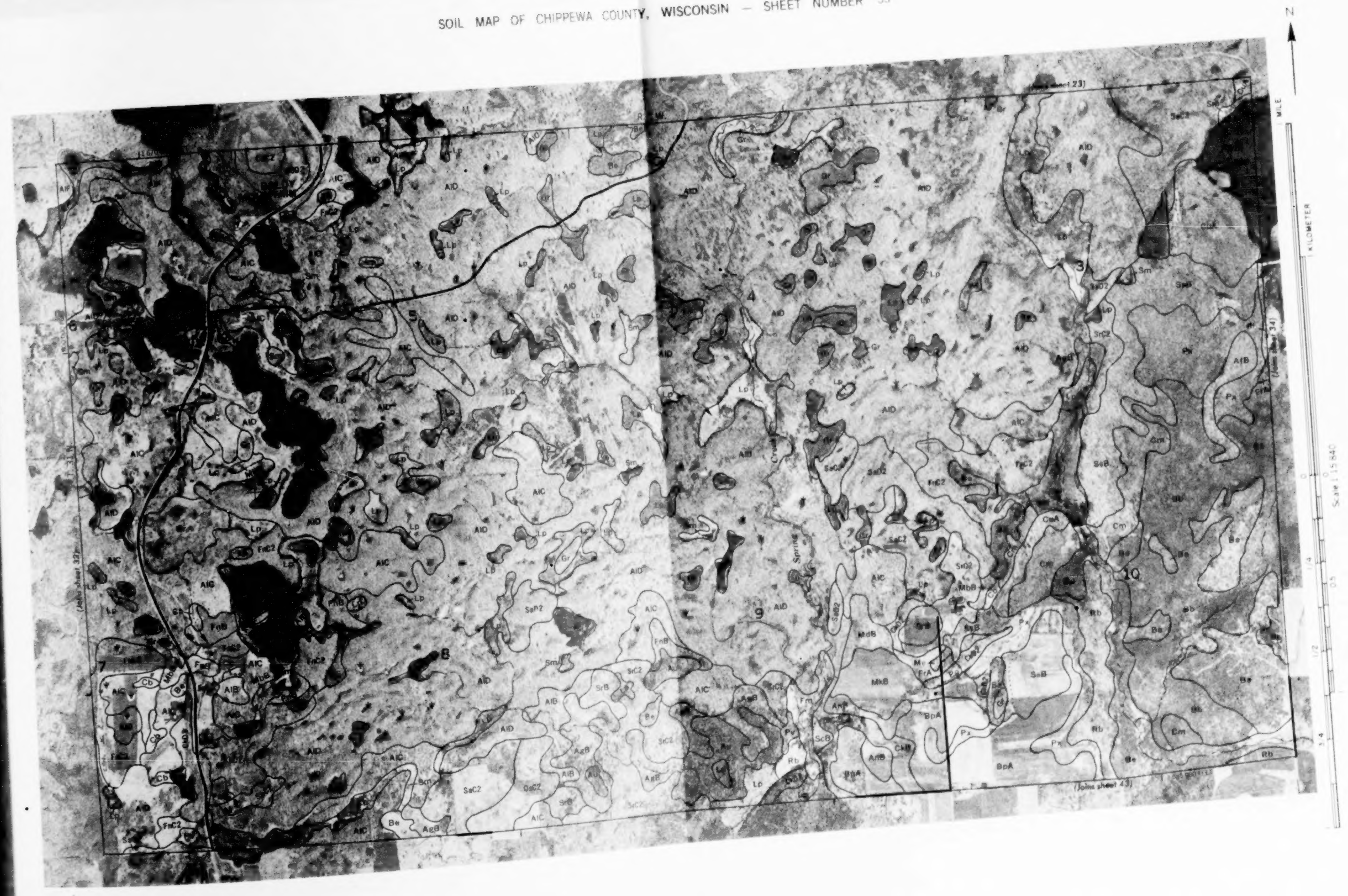
(32)

SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 32


N
MILE
KILOMETER
(Joins sheet 22)
R. 8 W. | R. 7 W.
SeC2
AlD
AlC
AlF
AlB
Lp
CdB
Cuk
10
11
12
1
2
3

(33)

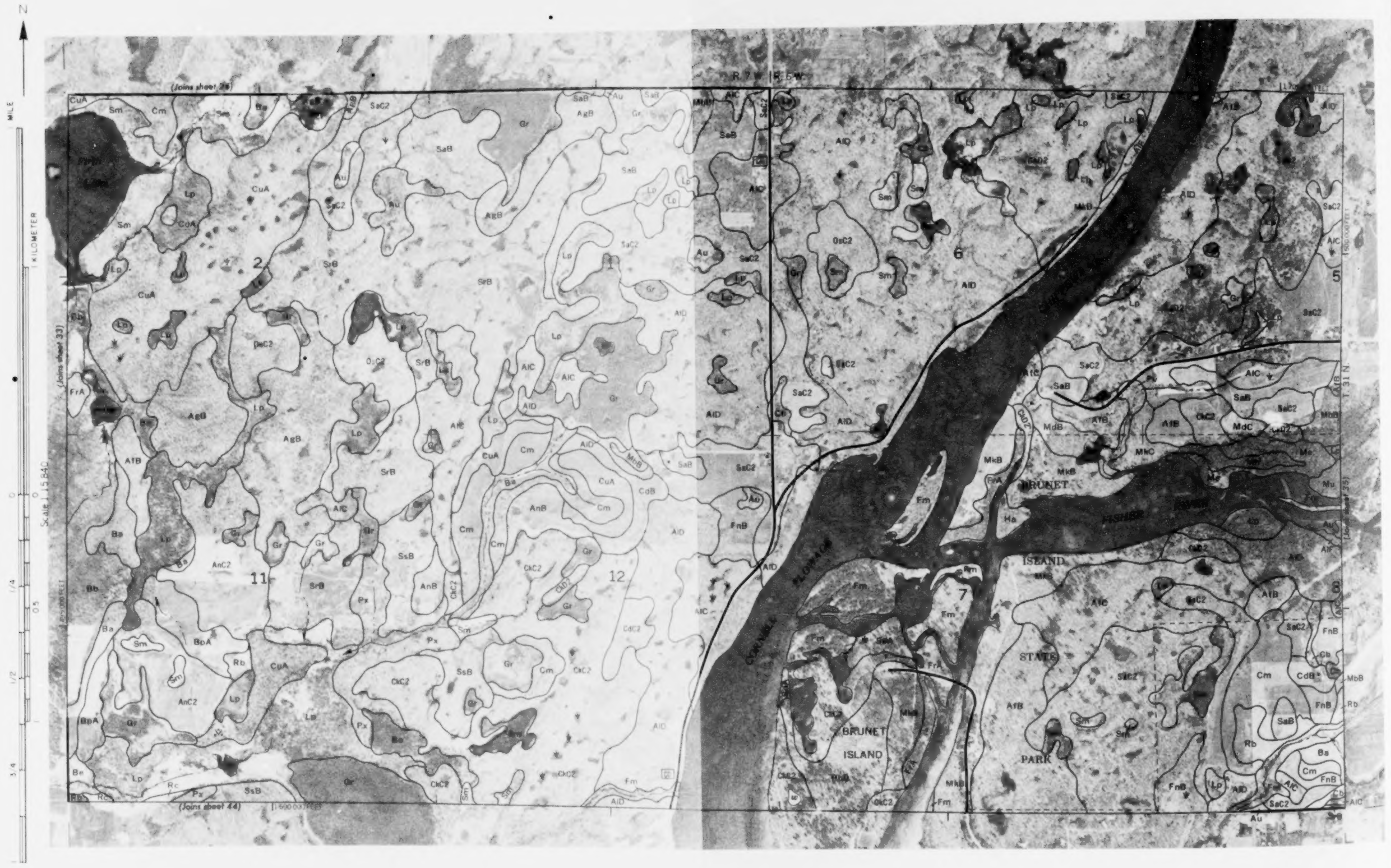
SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 33


N
MILE
KILOMETER
AlD
AlC
SeC2
MdB
SoA
8
9
10

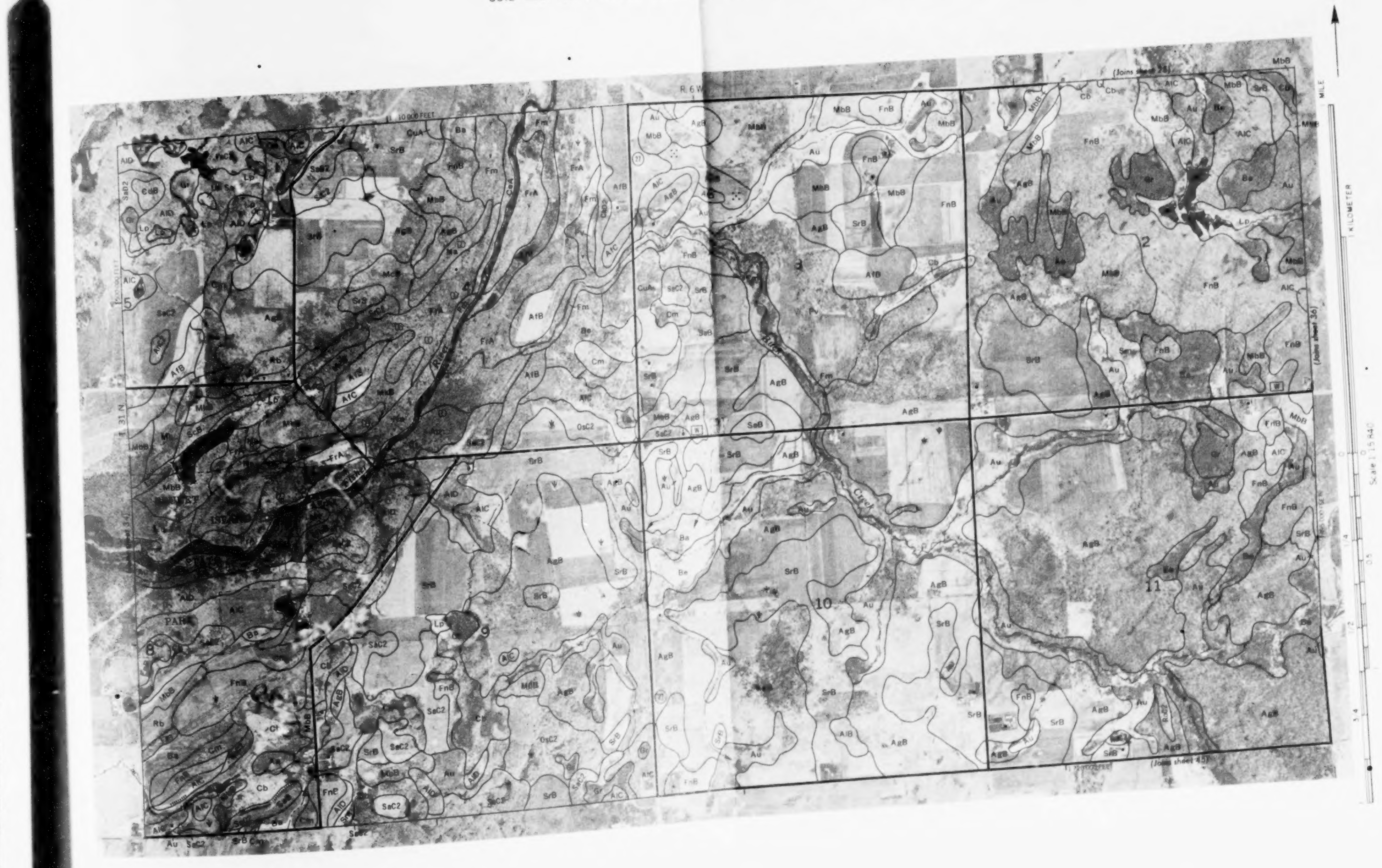
pages tightly bound

best copy available

SOIL MAP OF CHIPPEWA COUNTY WISCONSIN — SHEET NUMBER 34


N
BRUNET ISLAND
STATE PARK
ISLAND
BROKET
11
12
2
6
7

SOIL MAP OF CHIPPEWA COUNTY WISCONSIN — SHEET NUMBER 35


N
PARK
3
9
10
11

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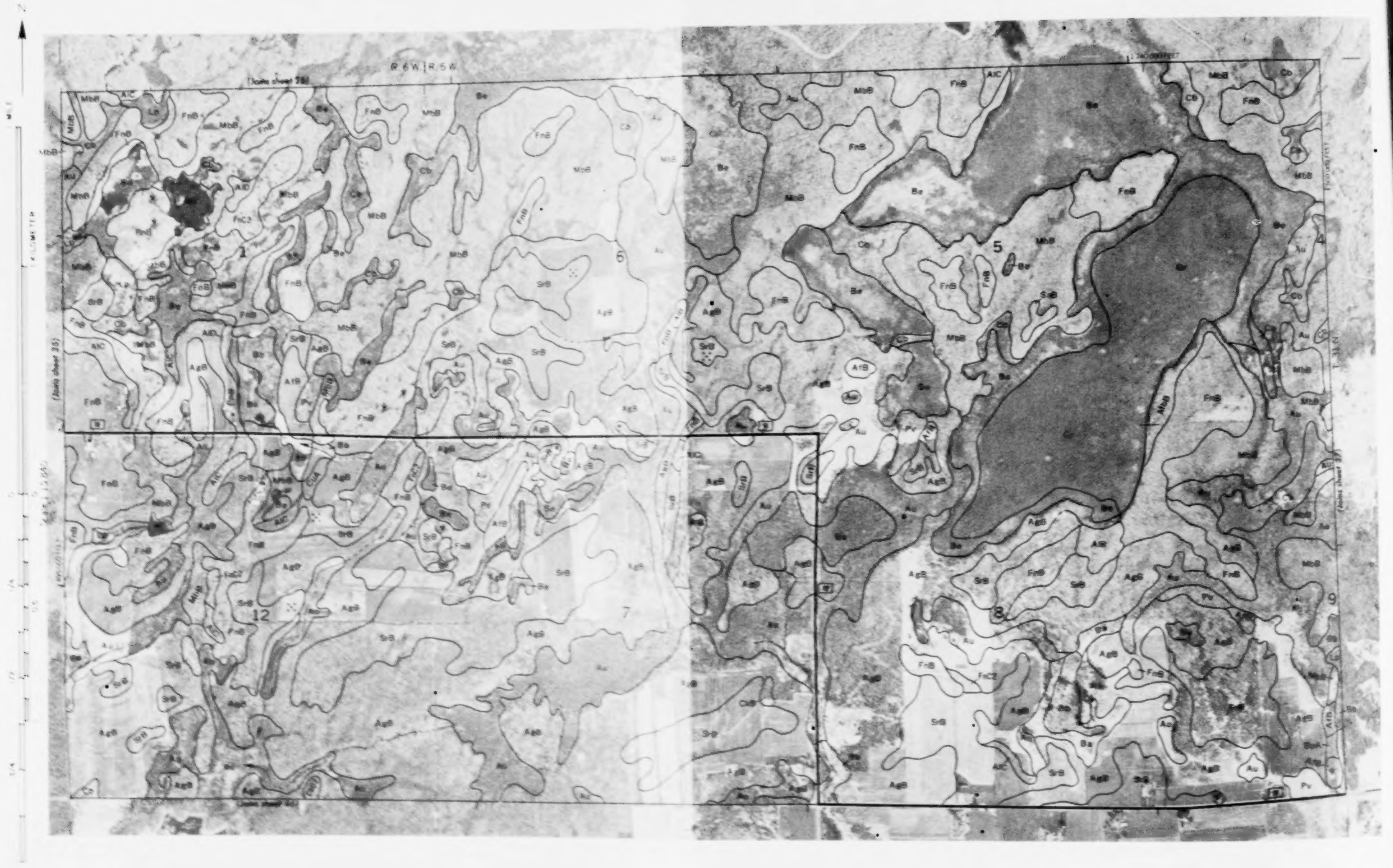
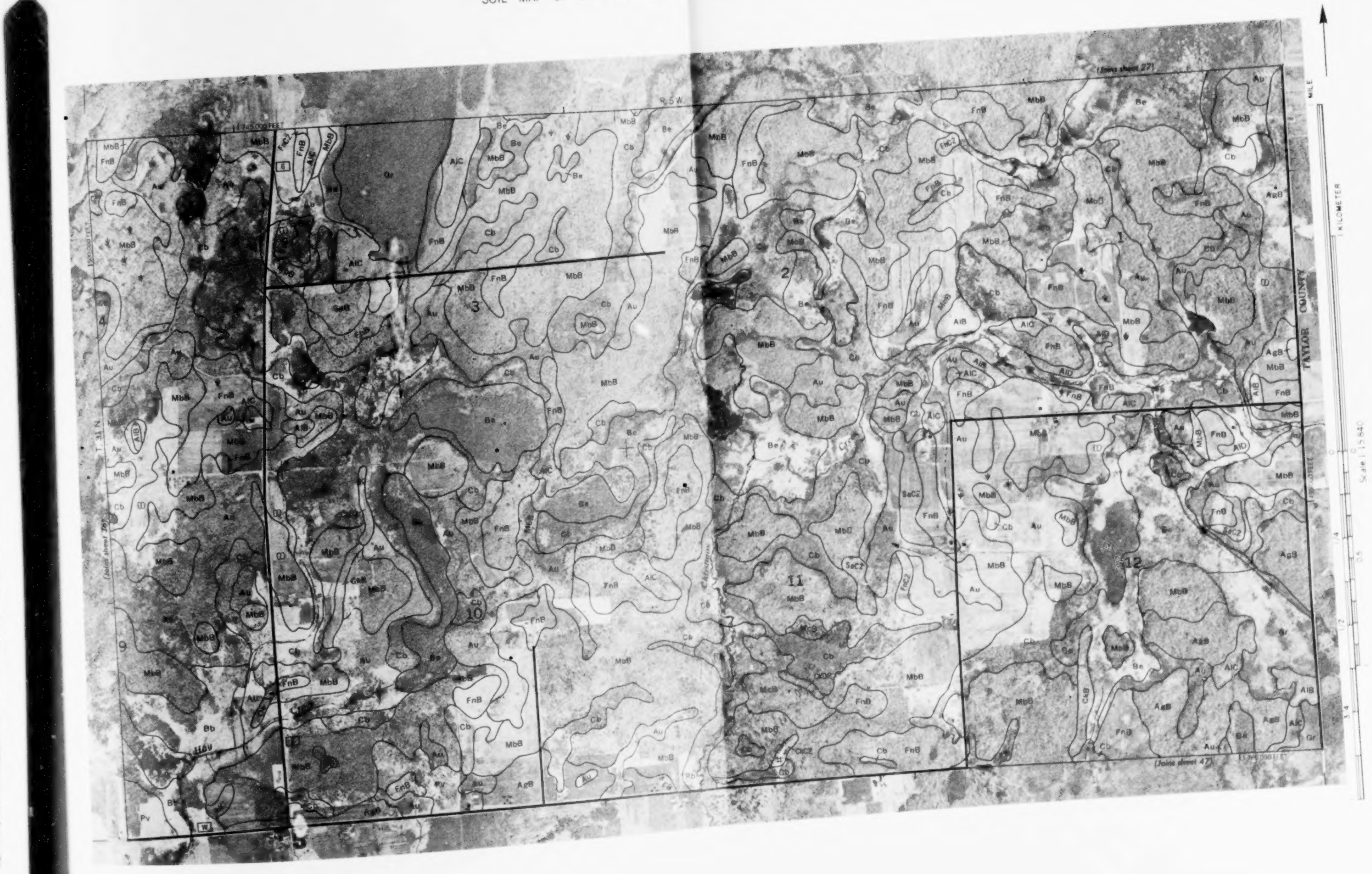
(36)

SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 36


N
MILE
KILOMETER
R 6 W. | R 5 W.
(Joins sheet 28)
MbB
AlC
FnB
Be
Cb
Au
AgB
5
6
7
8
12

SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 37

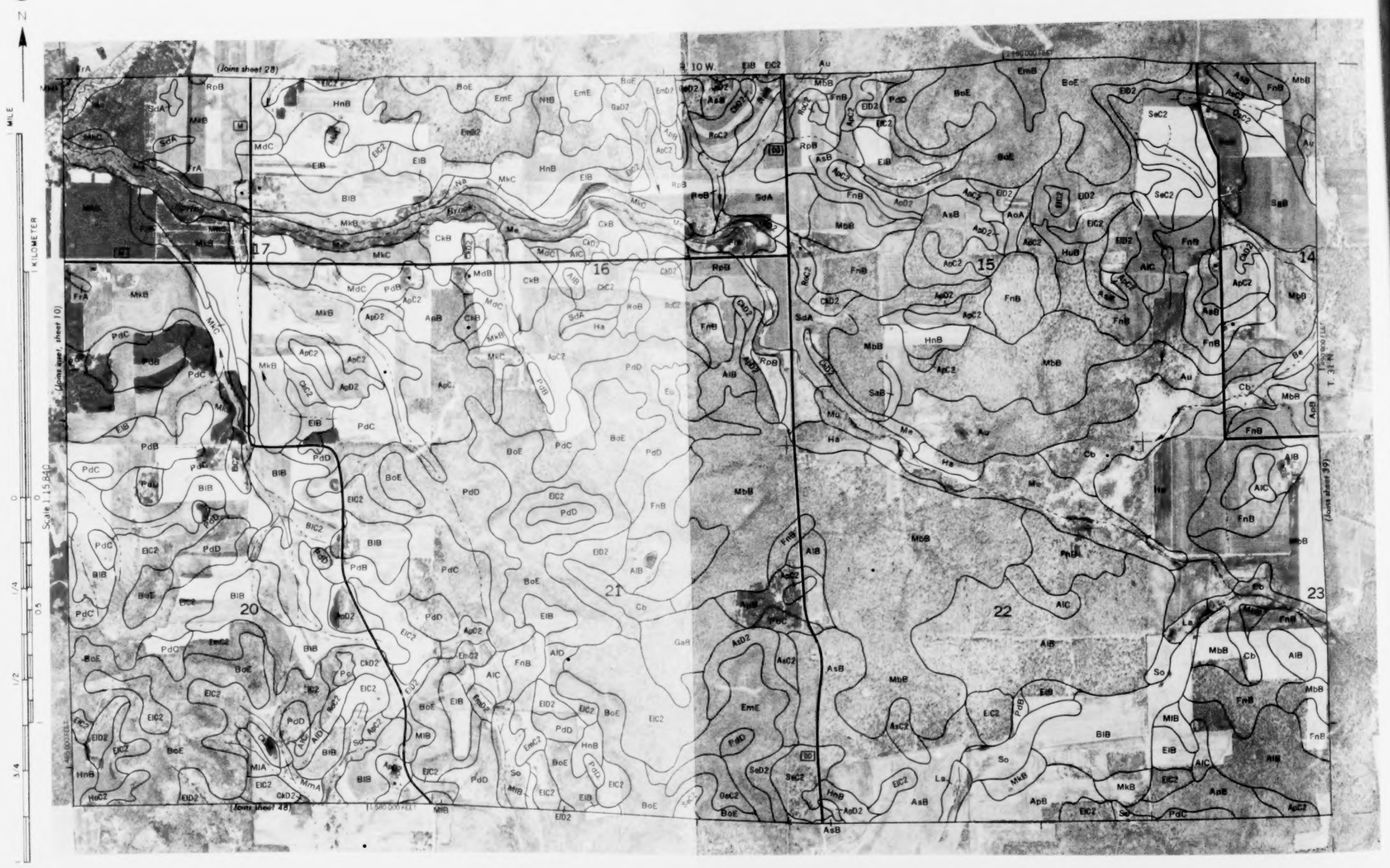
(37)


N
MILE
KILOMETER
R. 5 W.
(Joins sheet 27)
Au
Be
FnB
MbB
3
9
10
11
12

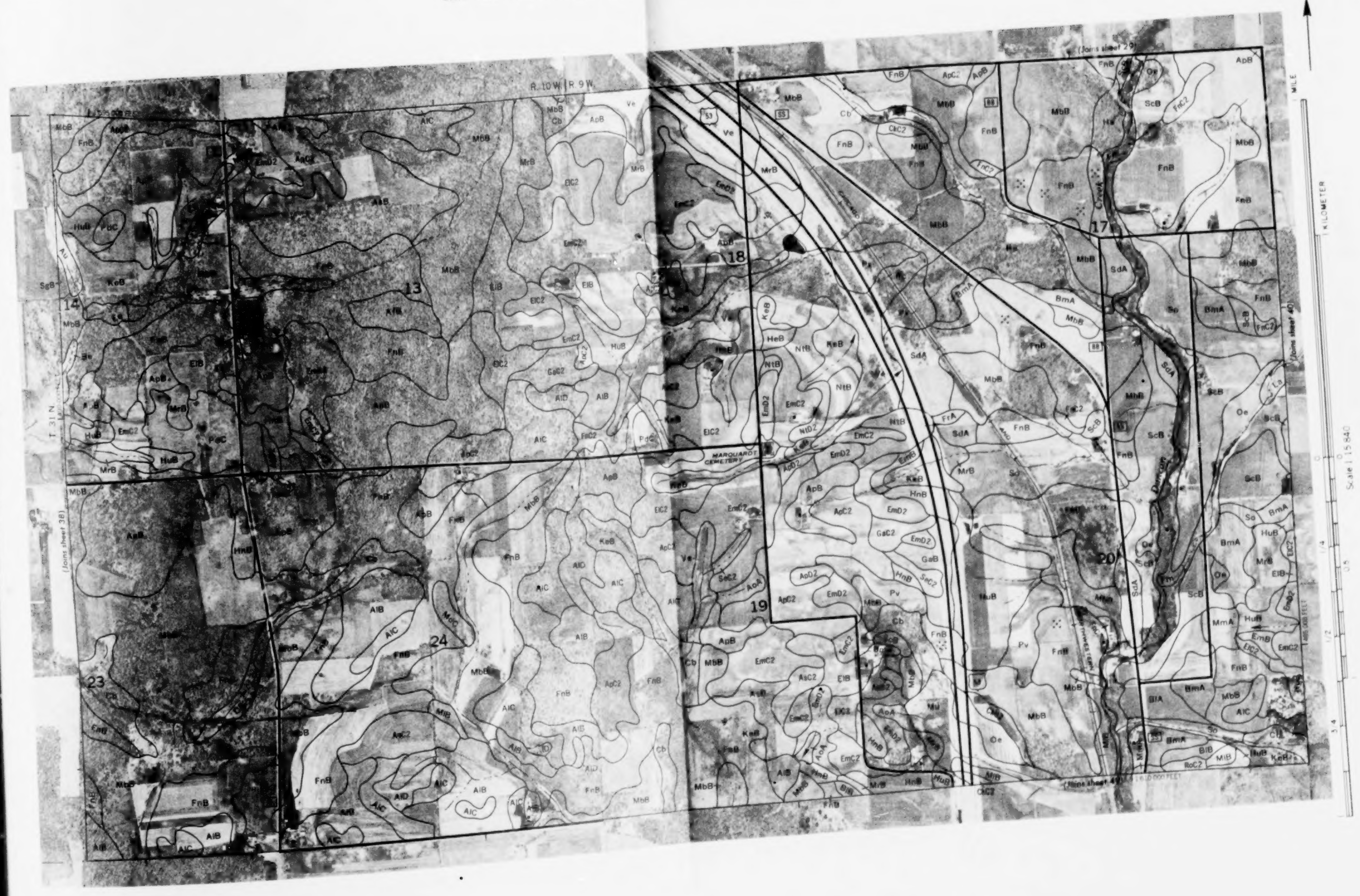
pages tightly bound

best copy available

SOIL MAP OF CHIPPEWA COUNTY WISCONSIN — SHEET NUMBER 38


N
R 10 W
17
16
15
14
20
21
22
23
(Joins sheet 29)
(Joins sheet 37)
(Joins sheet 39)
(Joins sheet 45)
MILE
KILOMETER
Scale 1:15 840

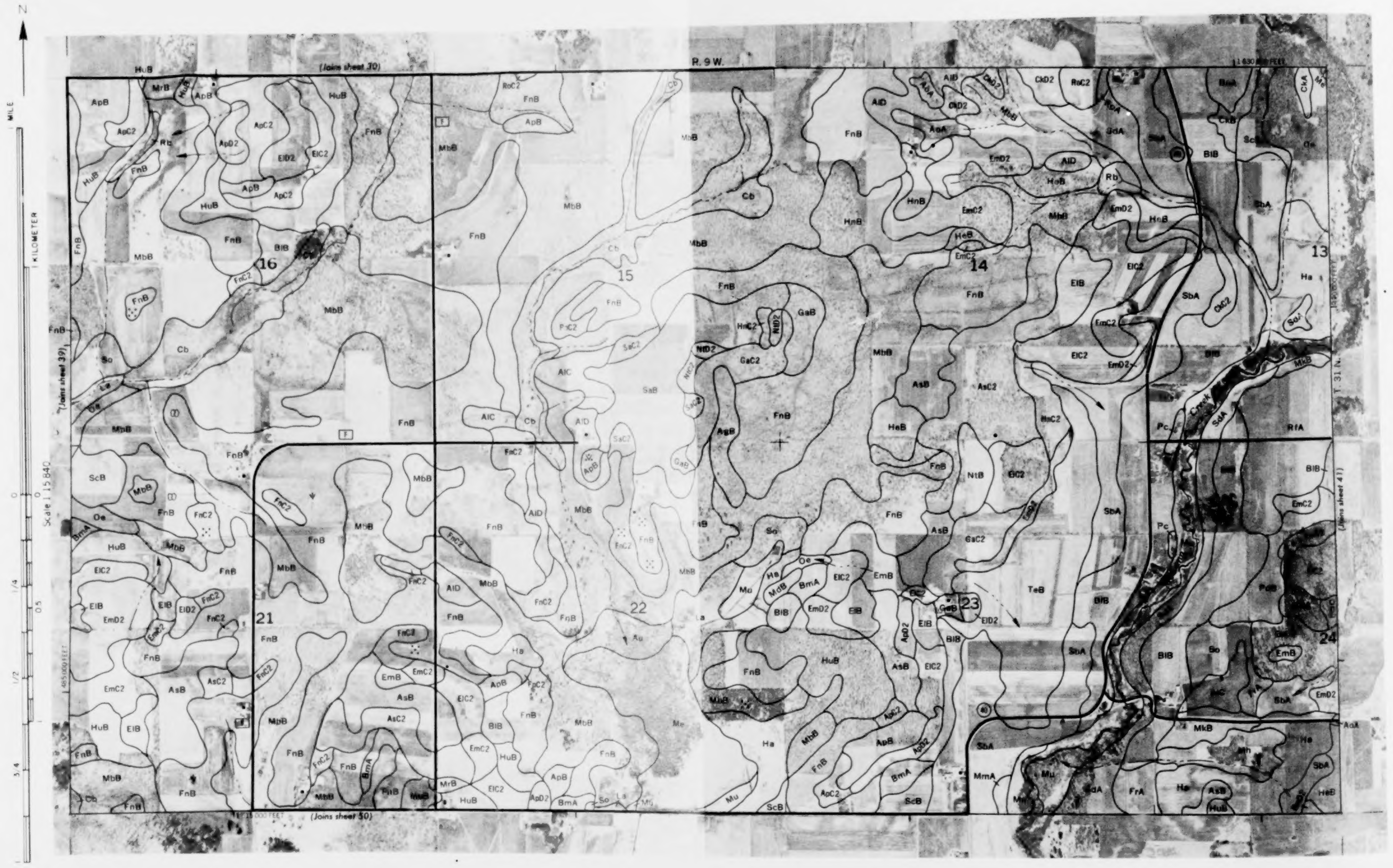
SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 39


N
R 10 W | R 9 W
13
18
17
24
19
20
23
(Joins sheet 38)
(Joins sheet 40)
MILE
KILOMETER
Scale 1:15 840

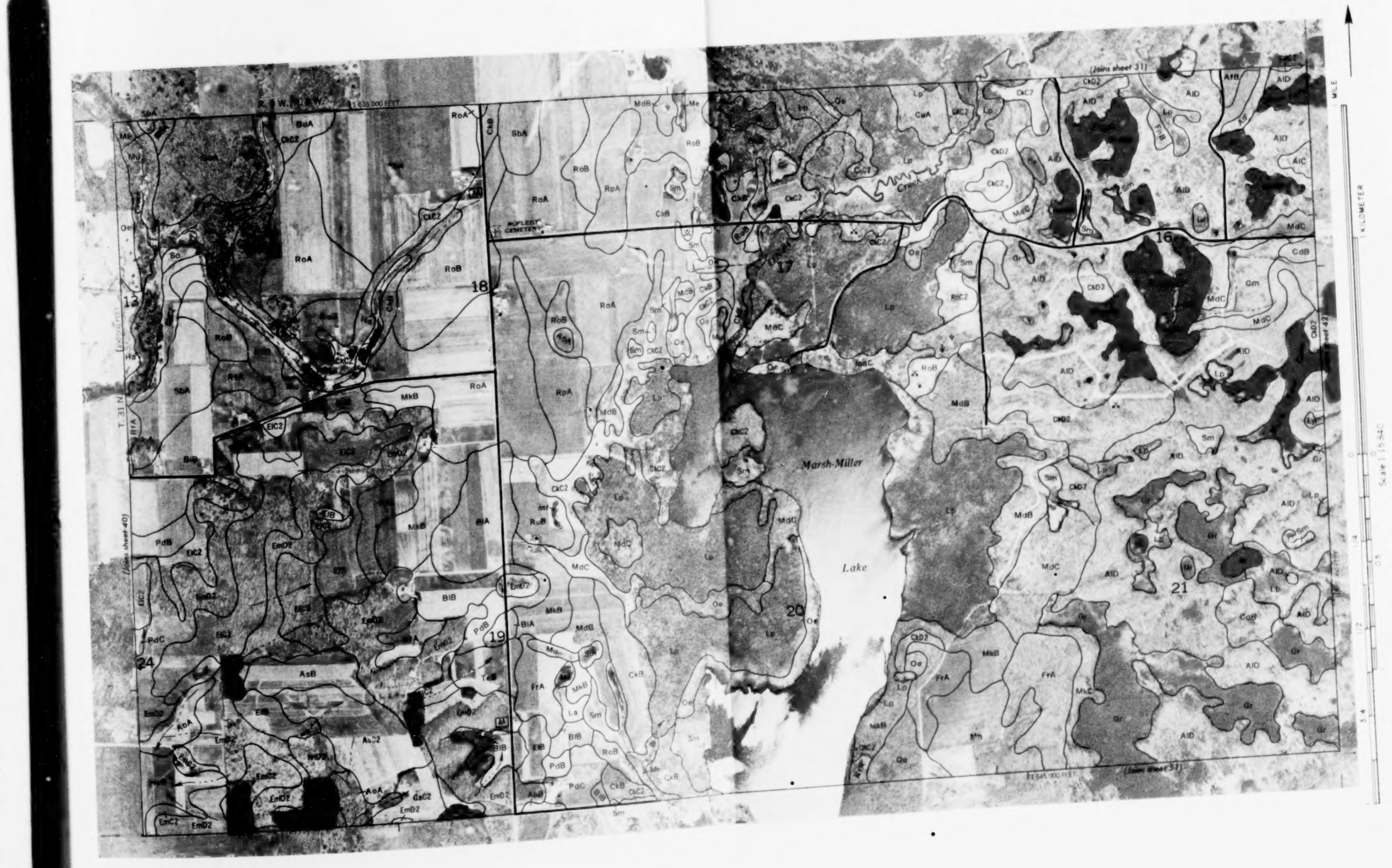
pages tightly bound

best copy available

SOIL MAP OF CHIPPEWA COUNTY WISCONSIN — SHEET NUMBER 40


N
(Joins sheet 30)
R. 9 W.
(Joins sheet 39)
(Joins sheet 41)
(Joins sheet 50)
16
15
14
13
21
22
23
24
KILOMETER
MILE

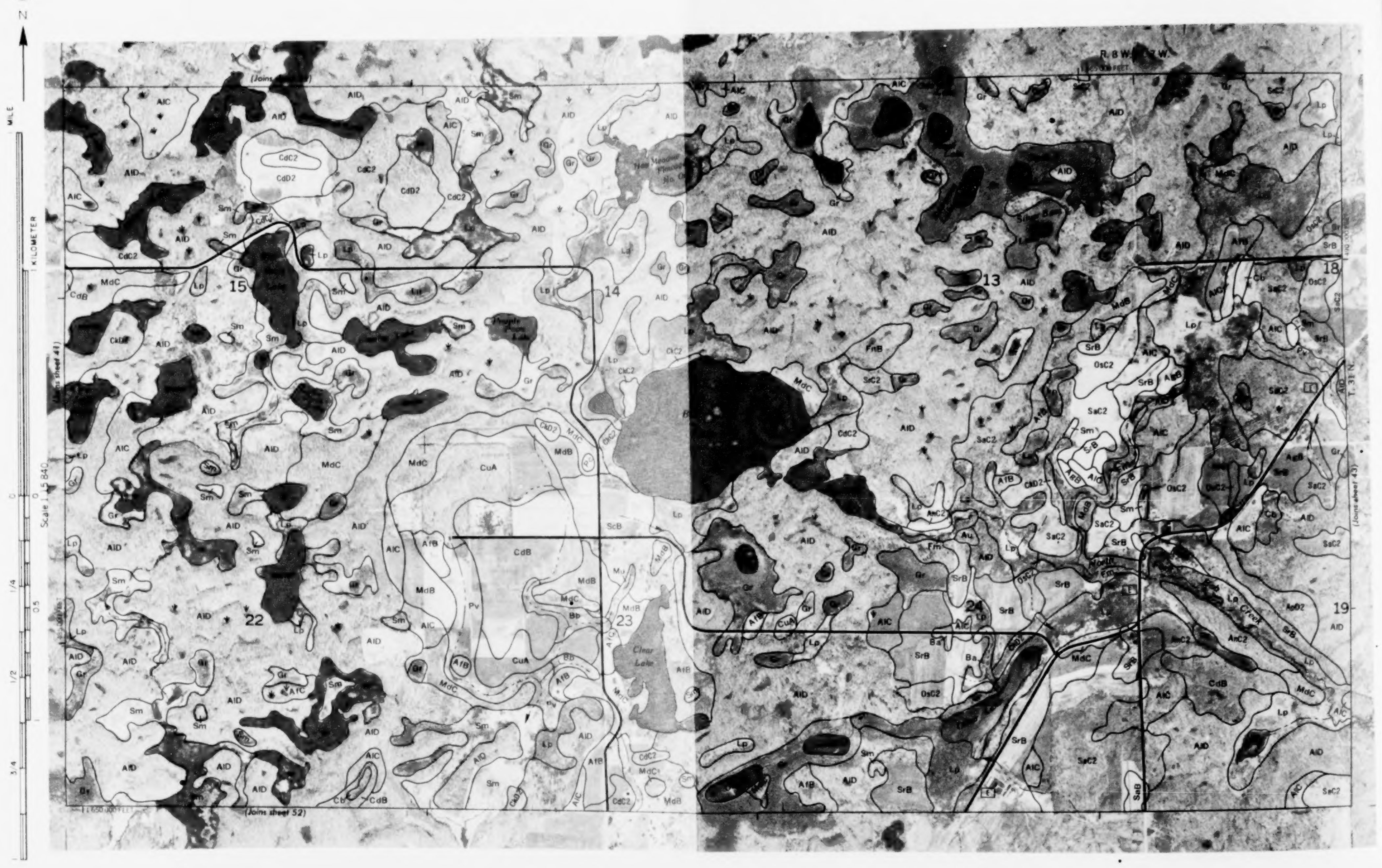
SOIL MAP OF CHIPPEWA COUNTY WISCONSIN — SHEET NUMBER 41


N
(Joins sheet 31)
(Joins sheet 40)
(Joins sheet 51)
13
18
17
16
24
19
20
21
Marsh-Miller
Lake
MILE
KILOMETER

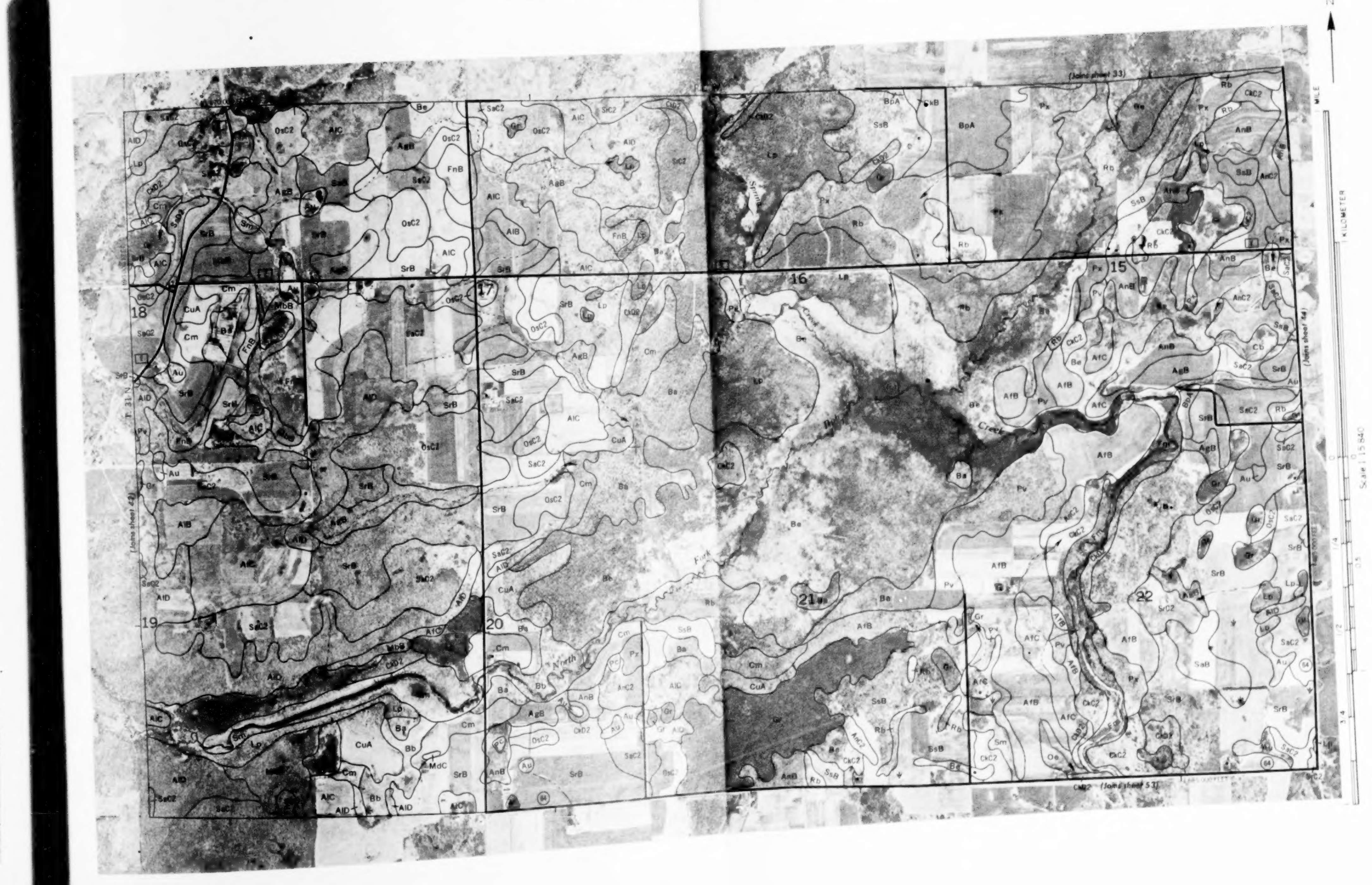
pages tightly bound

best copy available

SOIL MAP OF CHIPPEWA COUNTY **WISCONSIN** — SHEET NUMBER 42



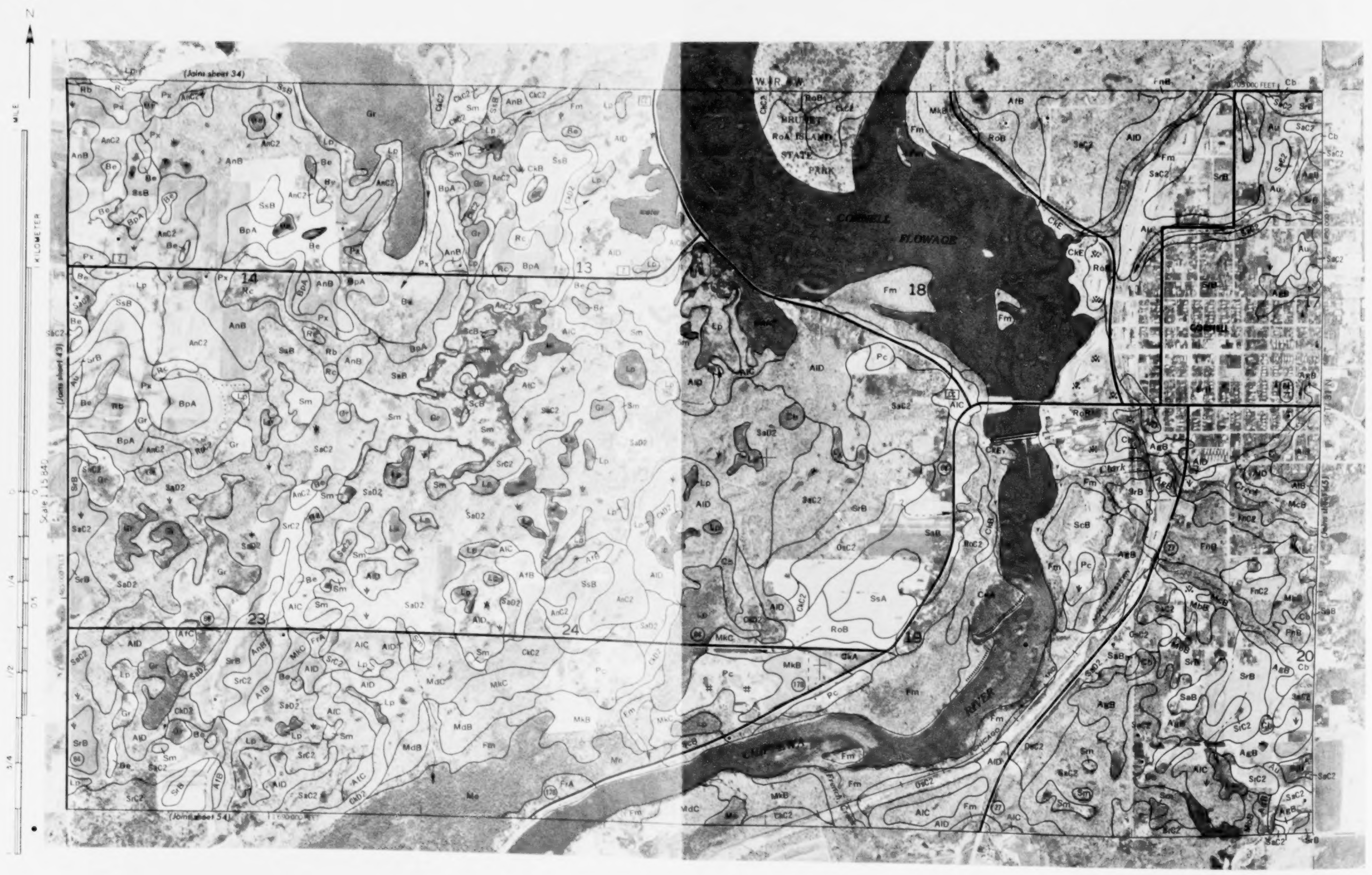
SOIL MAP OF CHIPPEWA COUNTY **WISCONSIN** — SHEET NUMBER 43



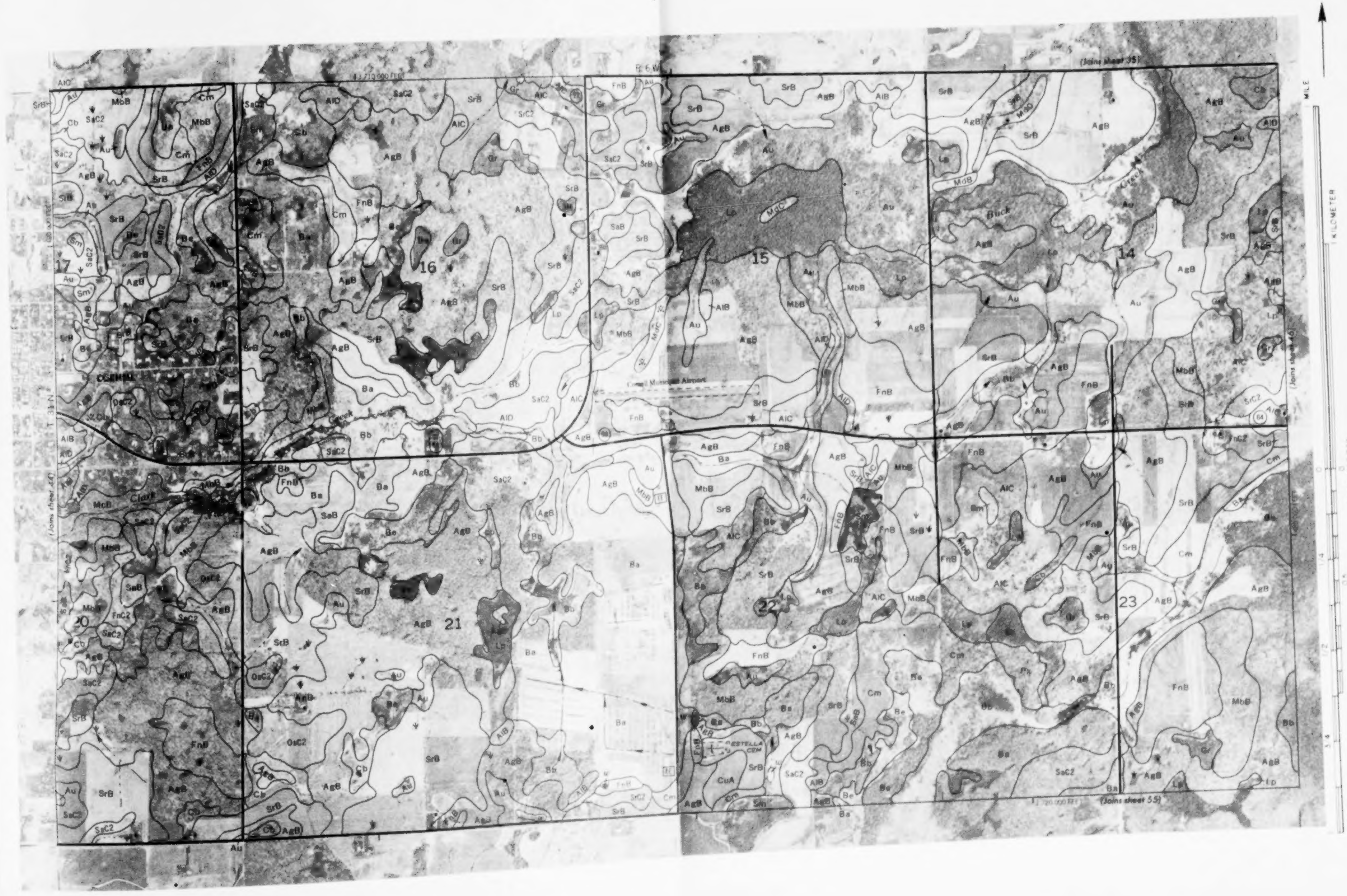
pages tightly bound

best copy available

SOIL MAP OF CHIPPEWA COUNTY WISCONSIN — SHEET NUMBER 44


N
(Joins sheet 34)
CORNELL FLOWAGE
STATE PARK
CHIPPEWA RIVER
13
14
18
23
24
(Joins sheet 54)
MILE
KILOMETER

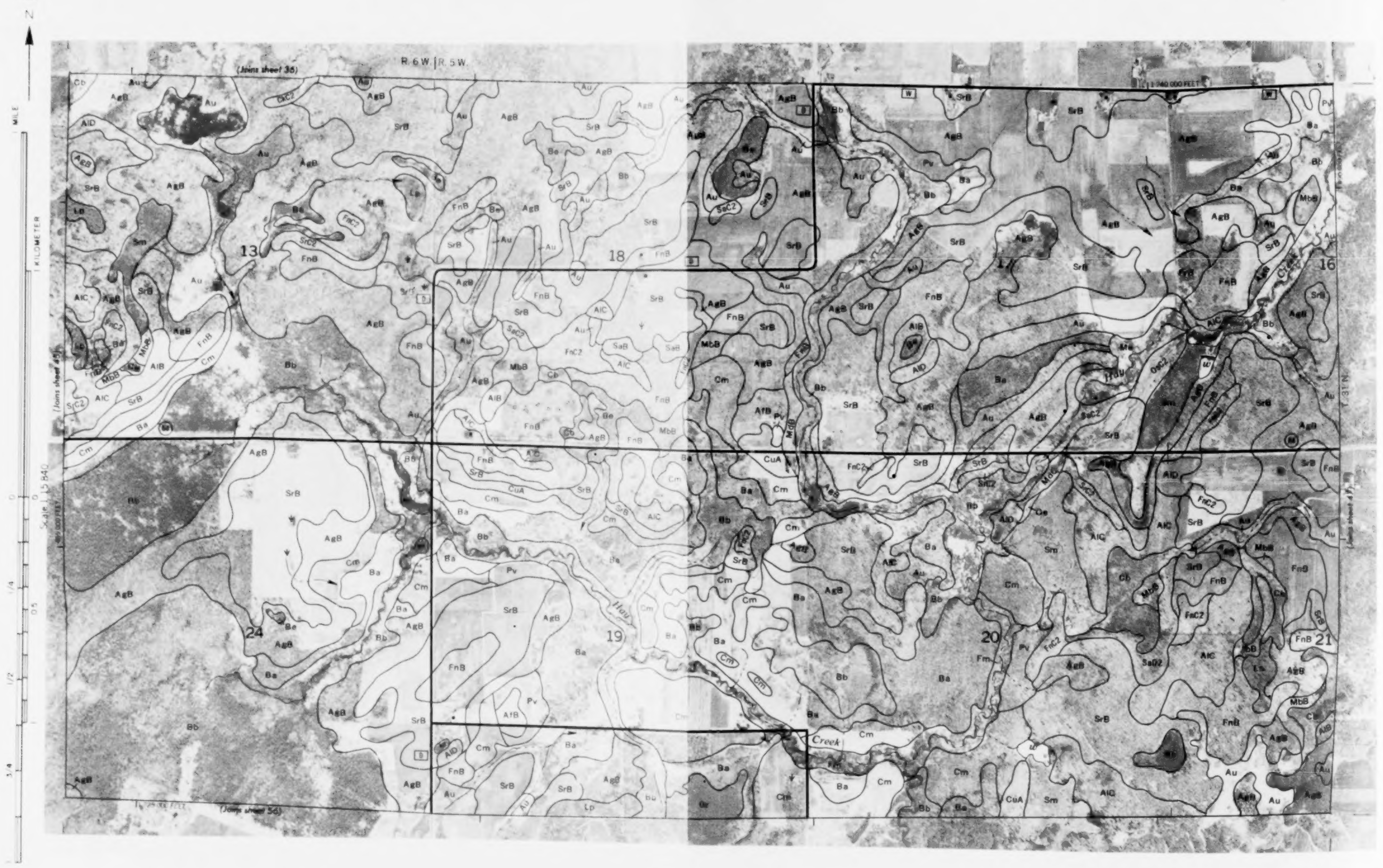
SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 45


N
R. 6 W.
(Joins sheet 35)
14
15
16
17
21
22
23
(Joins sheet 55)
MILE
KILOMETER

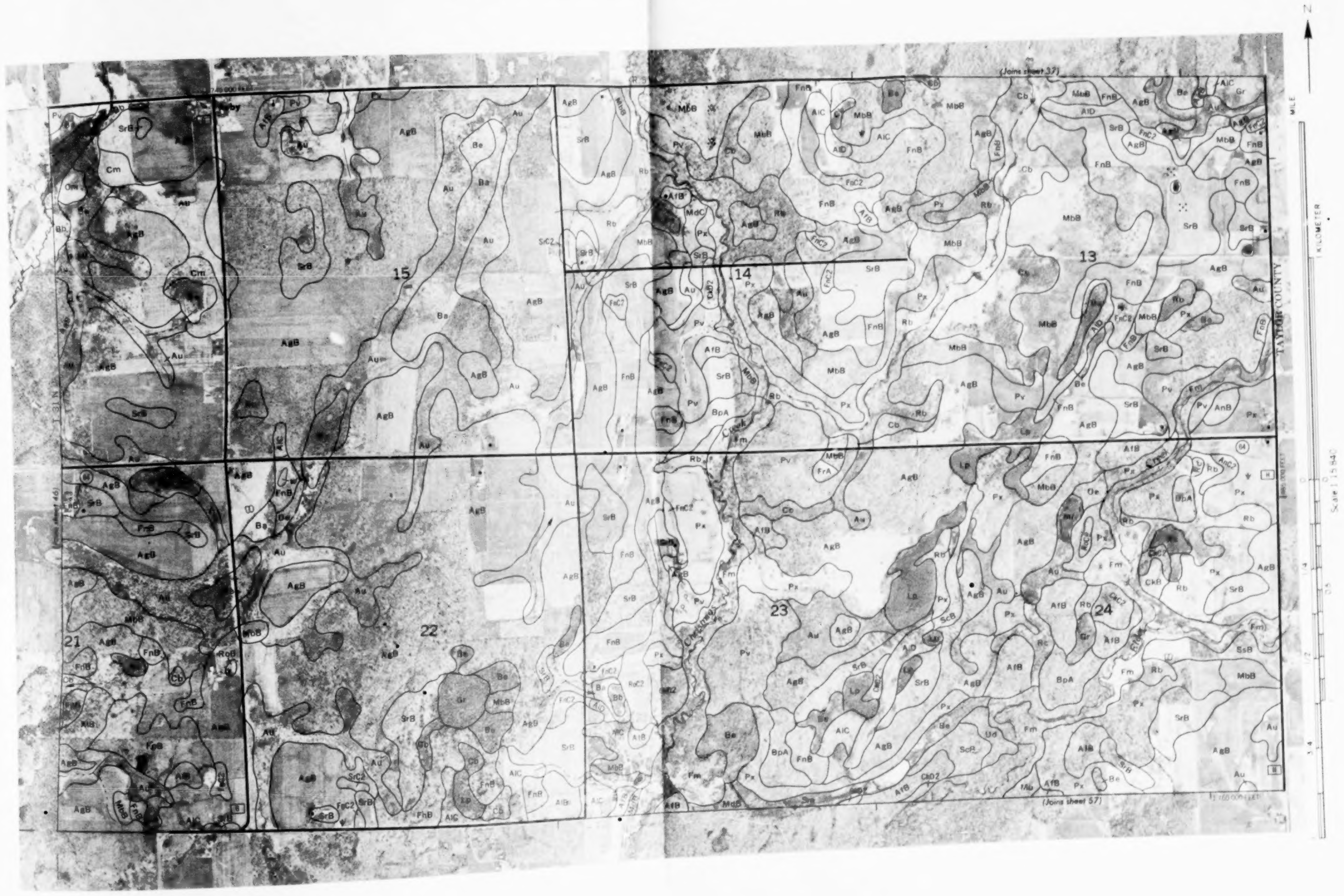
pages tightly bound

best copy available

SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 46


N
R.6 W. | R.5 W.
13
18
17
16
24
19
20
21
Creek

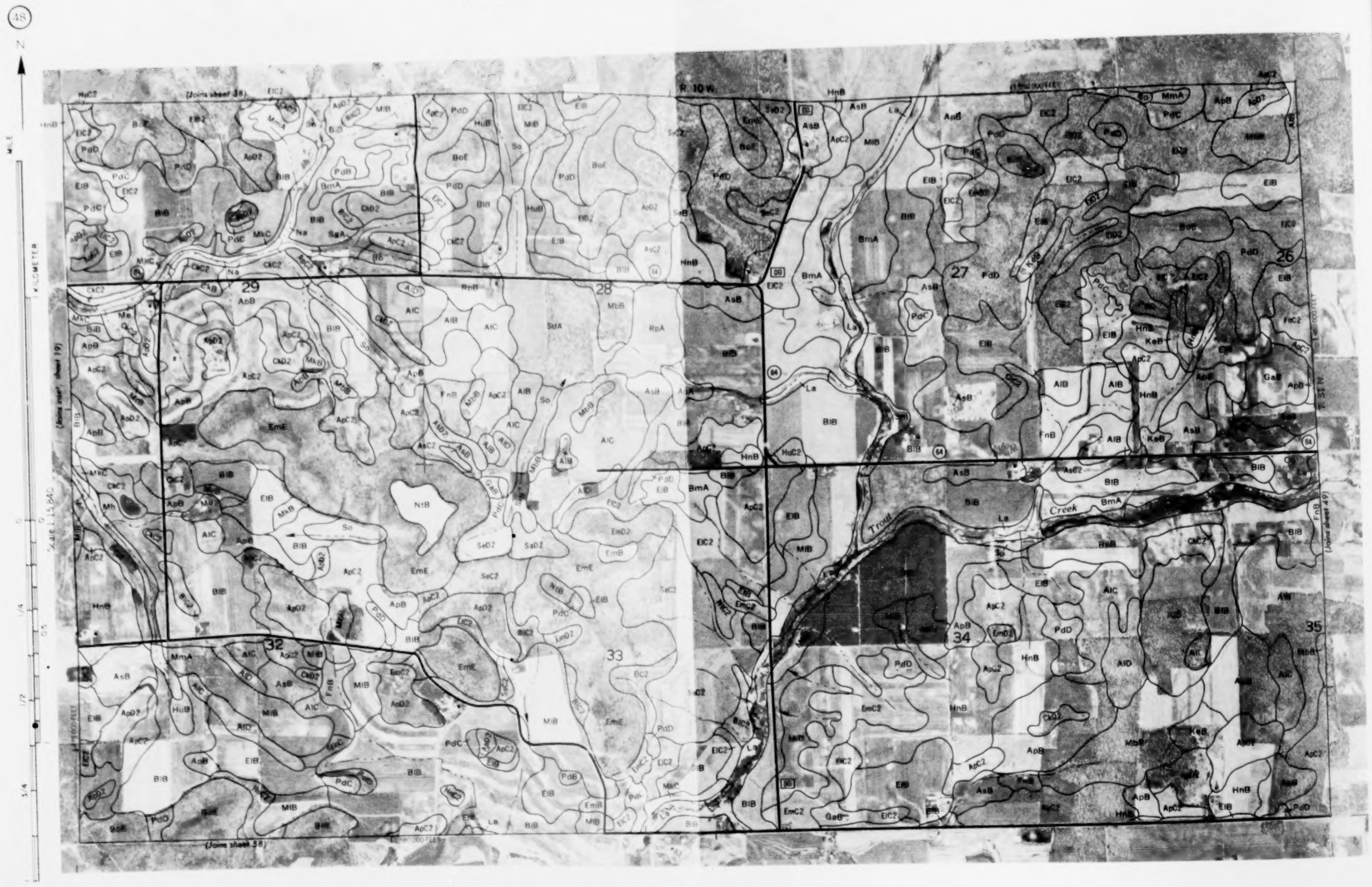
SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 47


N
15
14
13
21
22
23
24

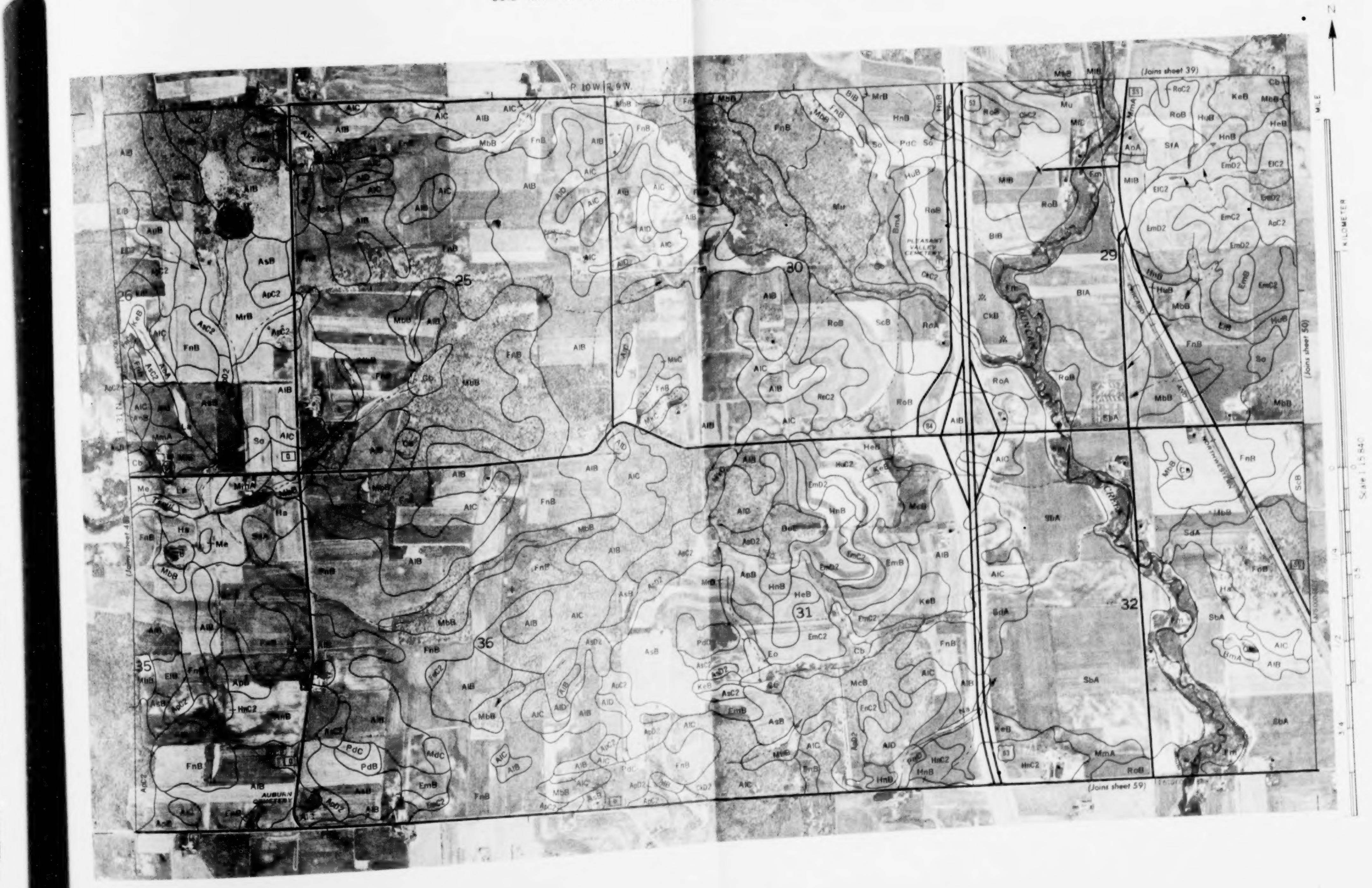
pages tightly bound

best copy available

SOIL MAP OF CHIPPEWA COUNTY WISCONSIN — SHEET NUMBER 48


N
(Joins sheet 38)
R. 10 W.
(Joins sheet 47)
Creek
(Joins sheet 58)
MILE
KILOMETER

SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 49

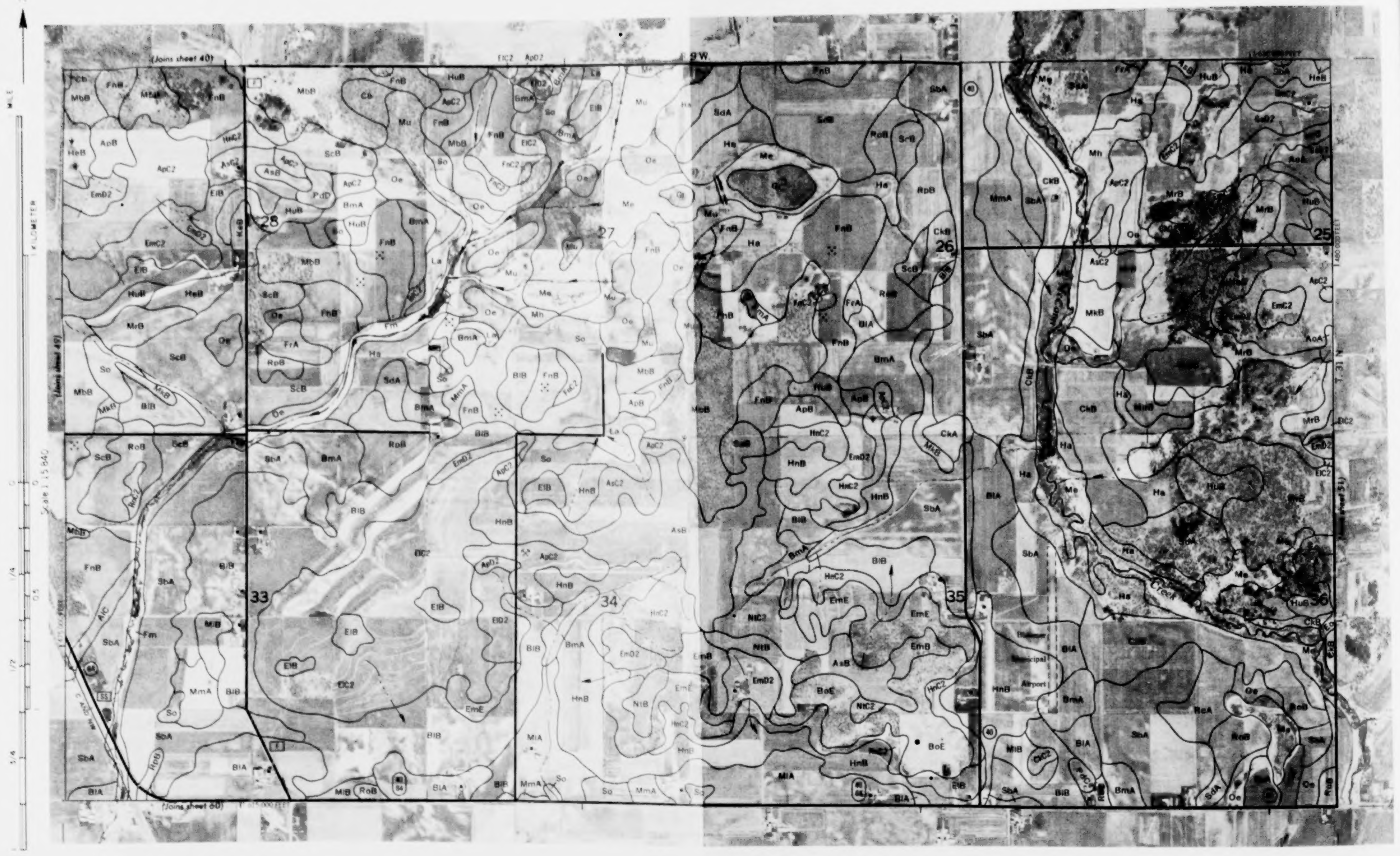

N
R. 10 W. | R. 9 W.
(Joins sheet 39)
(Joins sheet 50)
(Joins sheet 59)
MILE
KILOMETER

pages tightly bound

best copy available

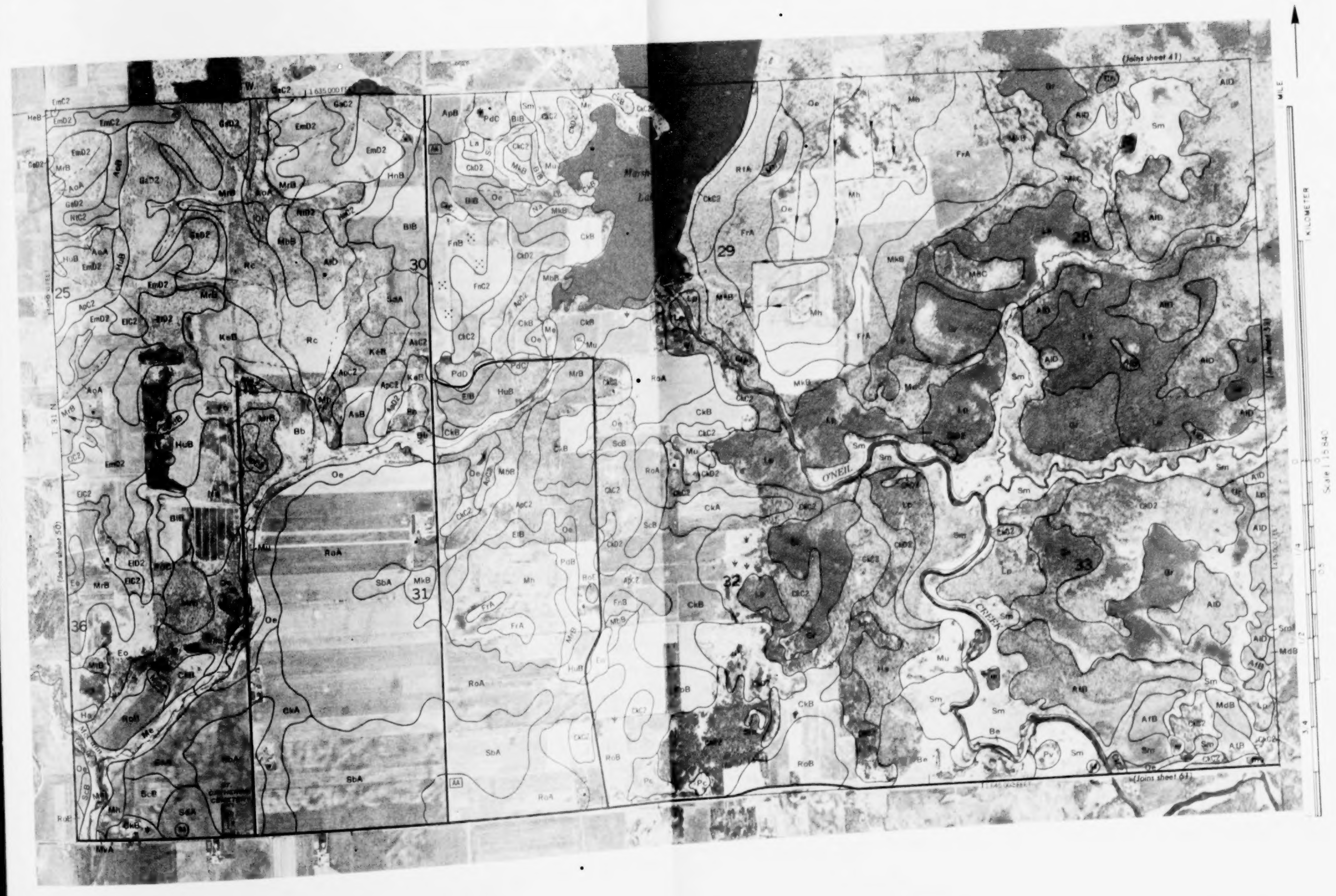
(50)

SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 50


N
(Joins sheet 40)
R. 9 W.
MILE
KILOMETER
27
26
25
33
34
35

SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 51

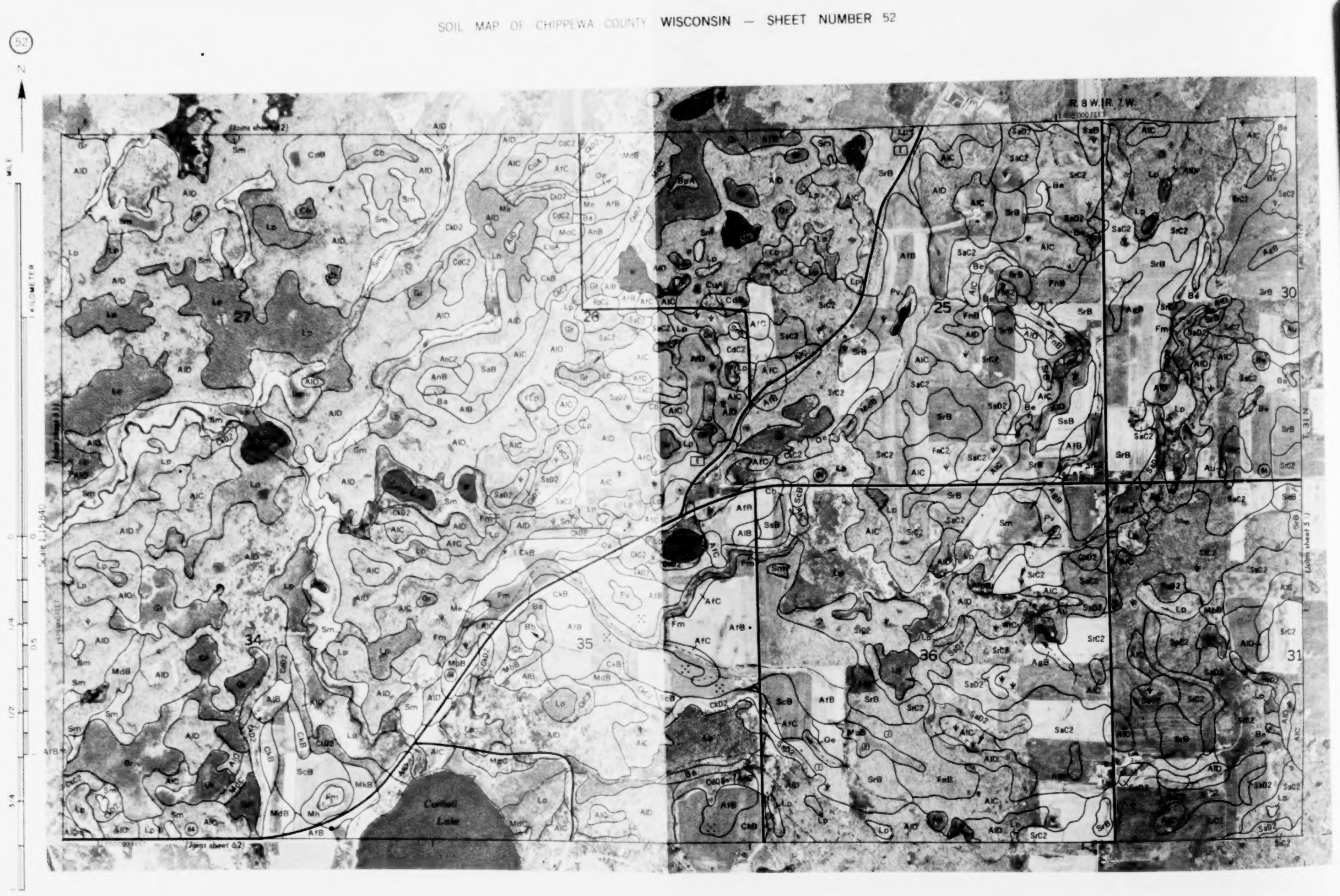
(51)


N
(Joins sheet 41)
MILE
KILOMETER
30
29
28
31
32
33
36
25

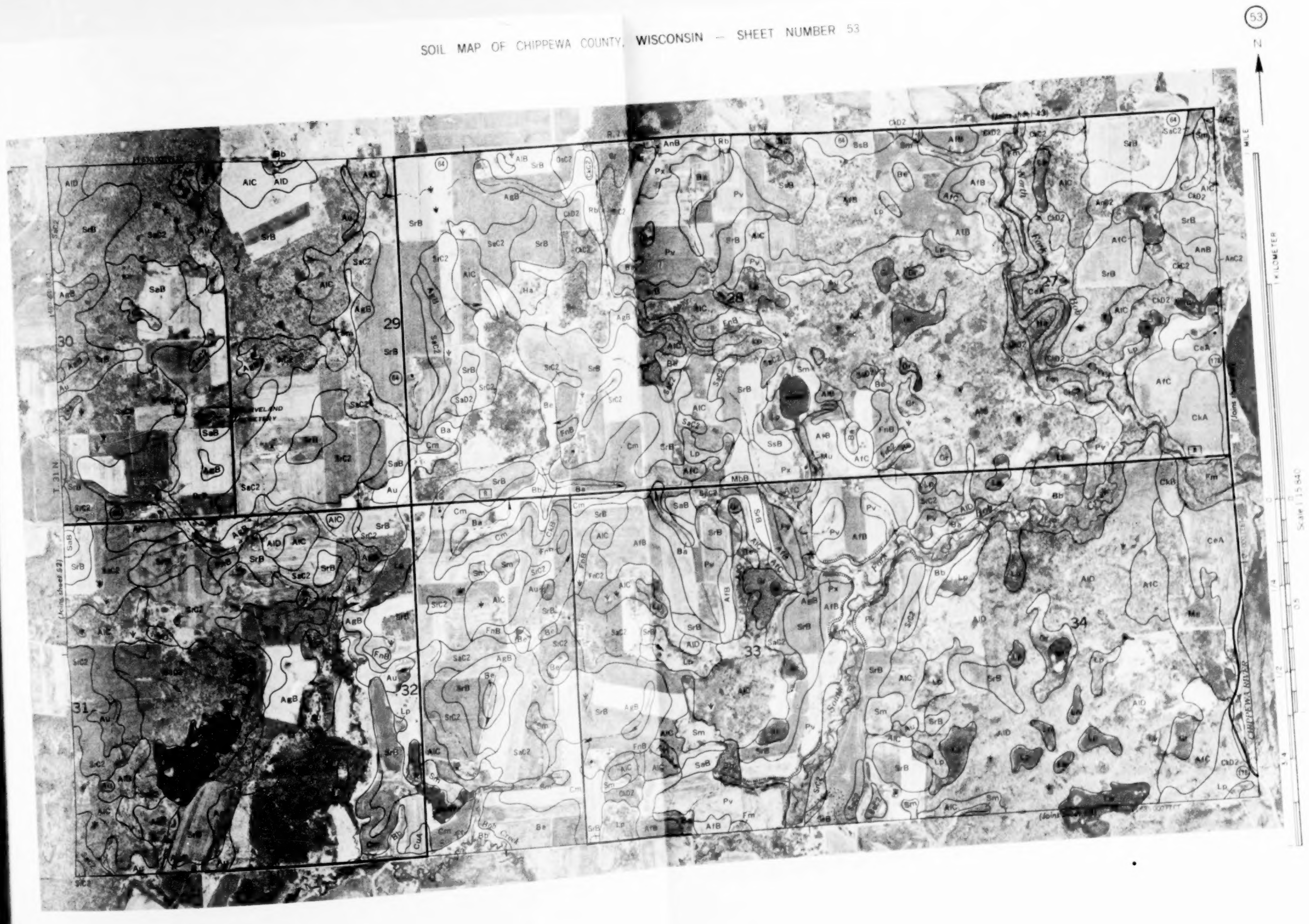
pages tightly bound

best copy available

SOIL MAP OF CHIPPEWA COUNTY WISCONSIN — SHEET NUMBER 52


52
N
27
25
30
34
35
36
31
Cornell Lake

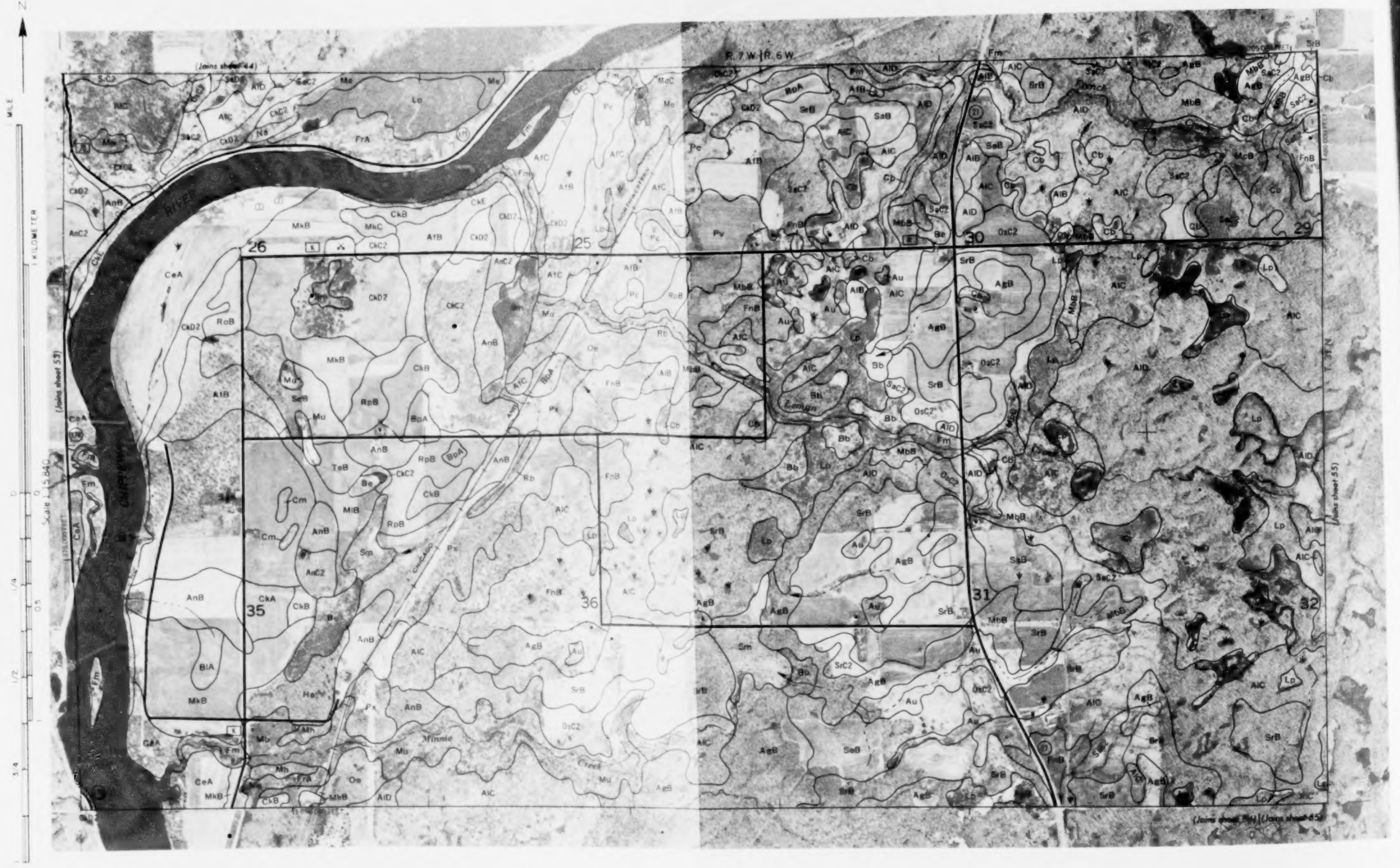
SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 53


53
N
30
29
27
31
32
33
34
MILE

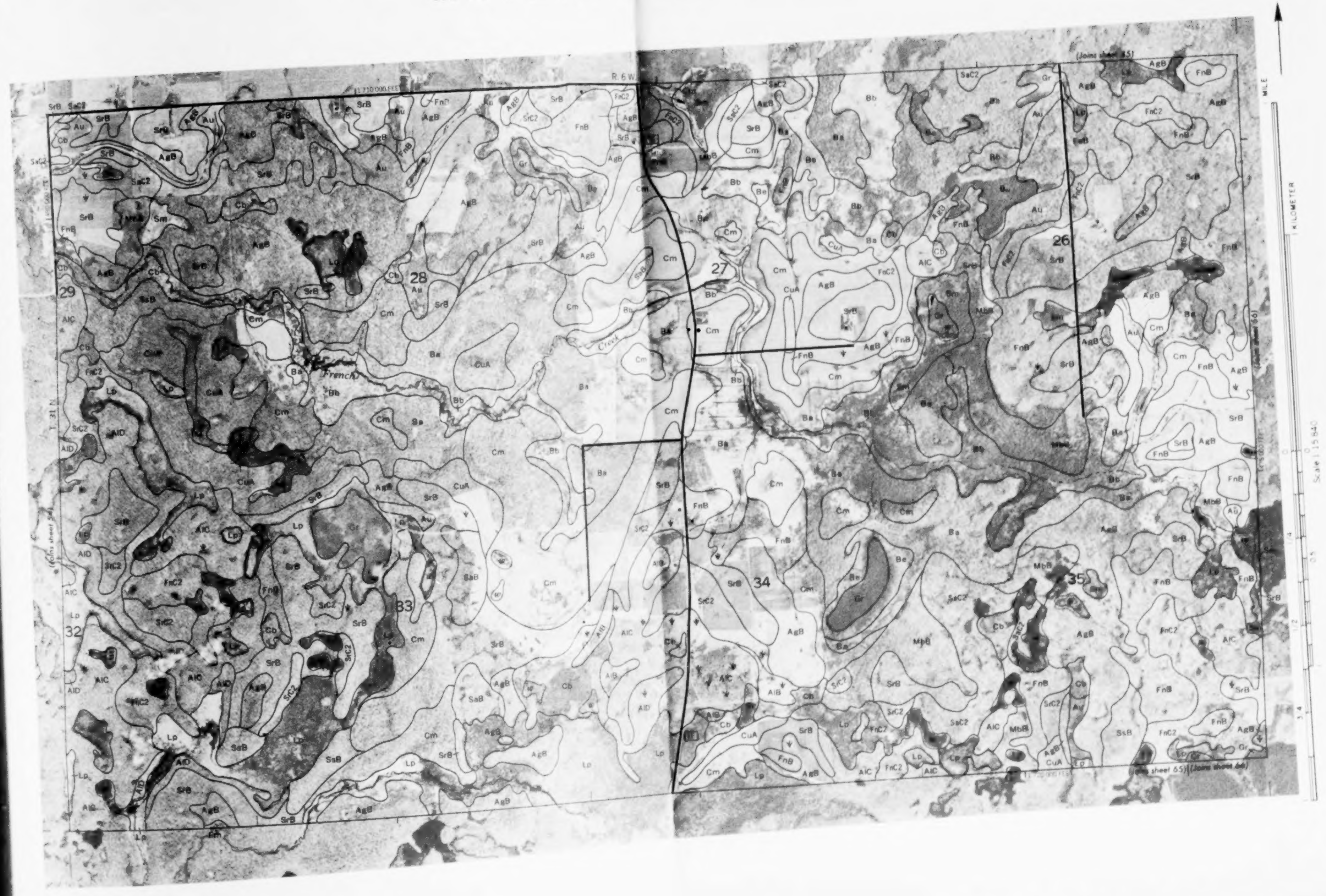
pages tightly bound

best copy available

SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 54


N
26
25
30
29
35
36
31
32

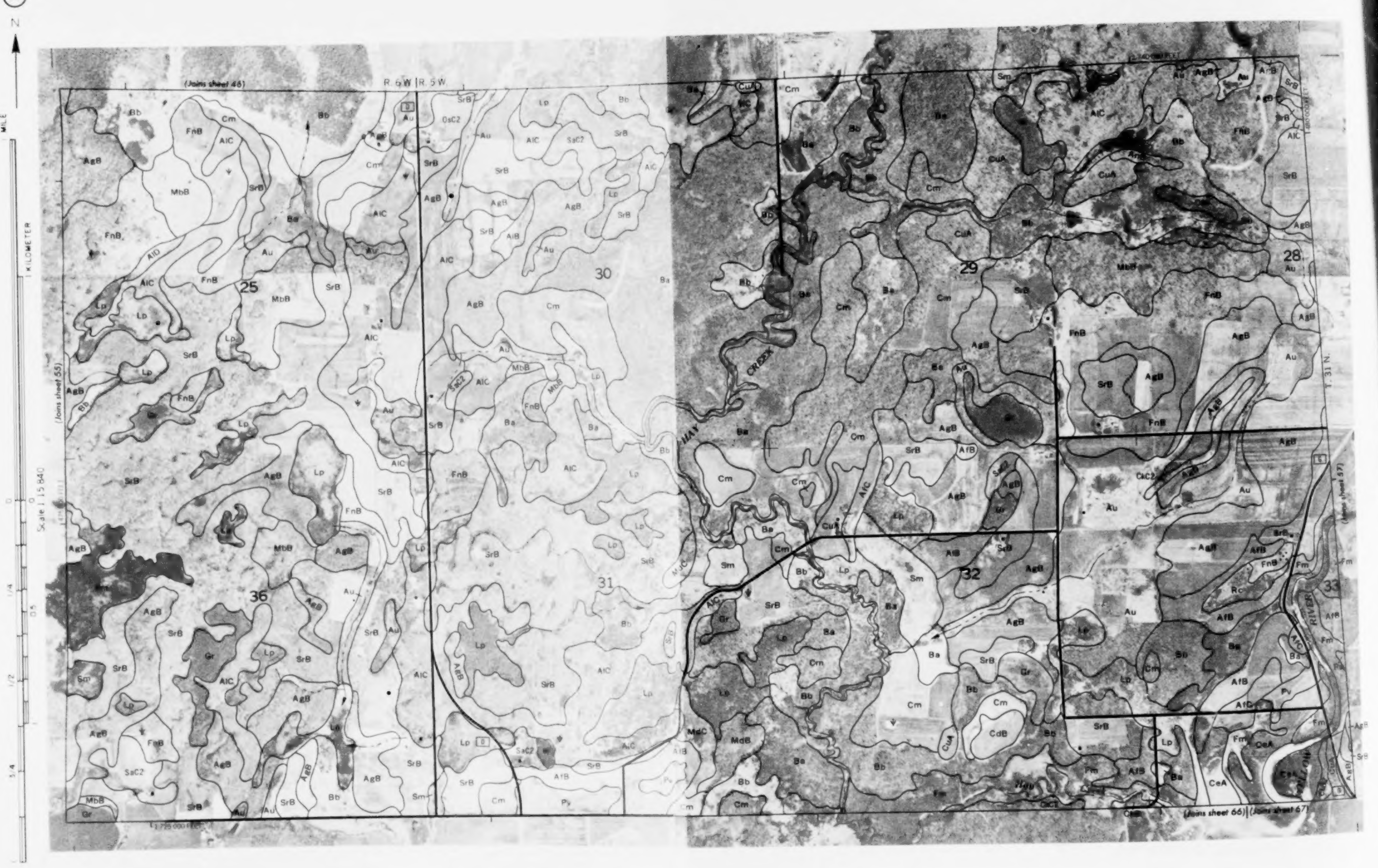
SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 55


N
29
28
27
26
32
33
34
35

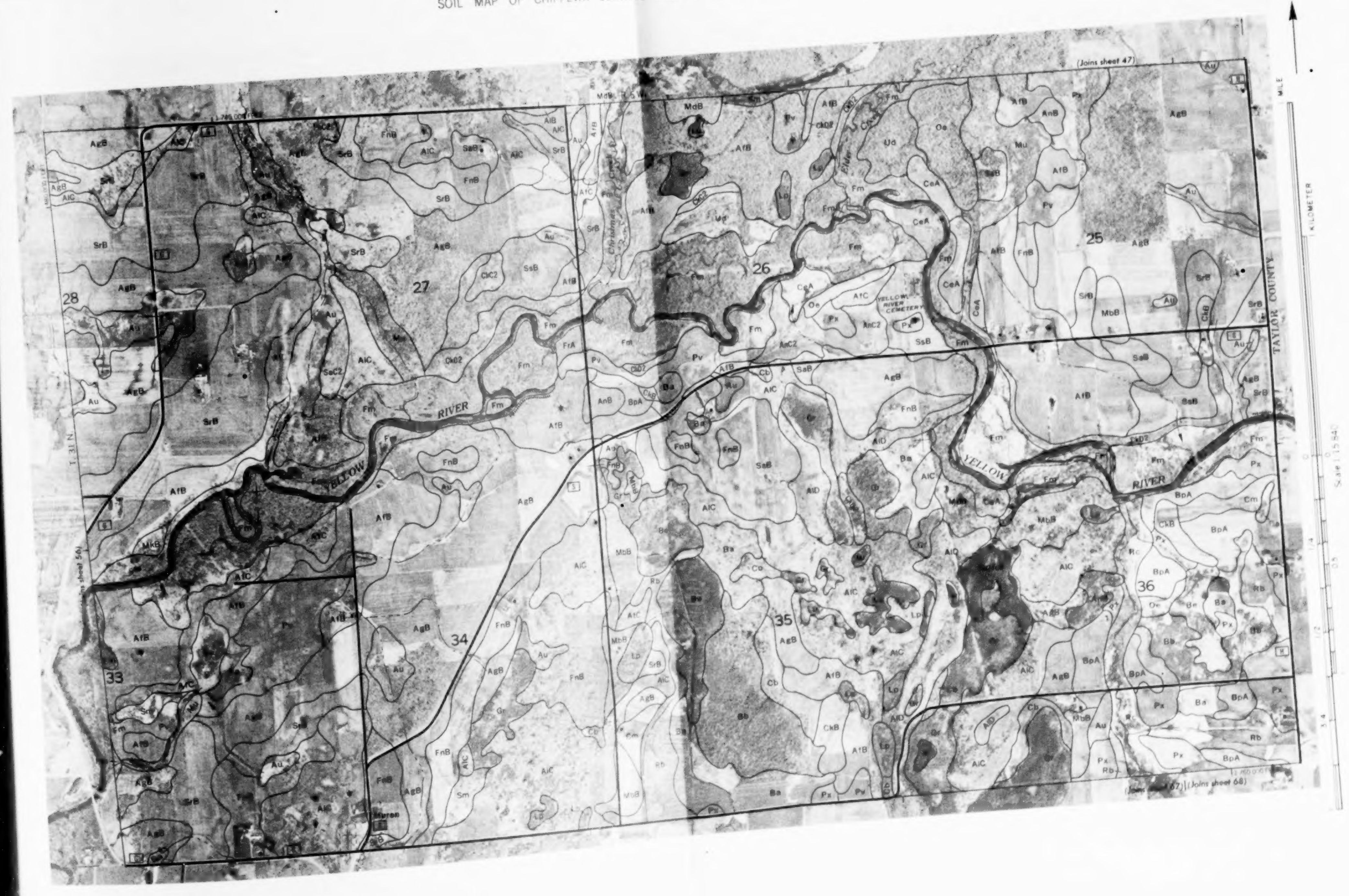
pages tightly bound

best copy available

SOIL MAP OF CHIPPEWA COUNTY WISCONSIN — SHEET NUMBER 56



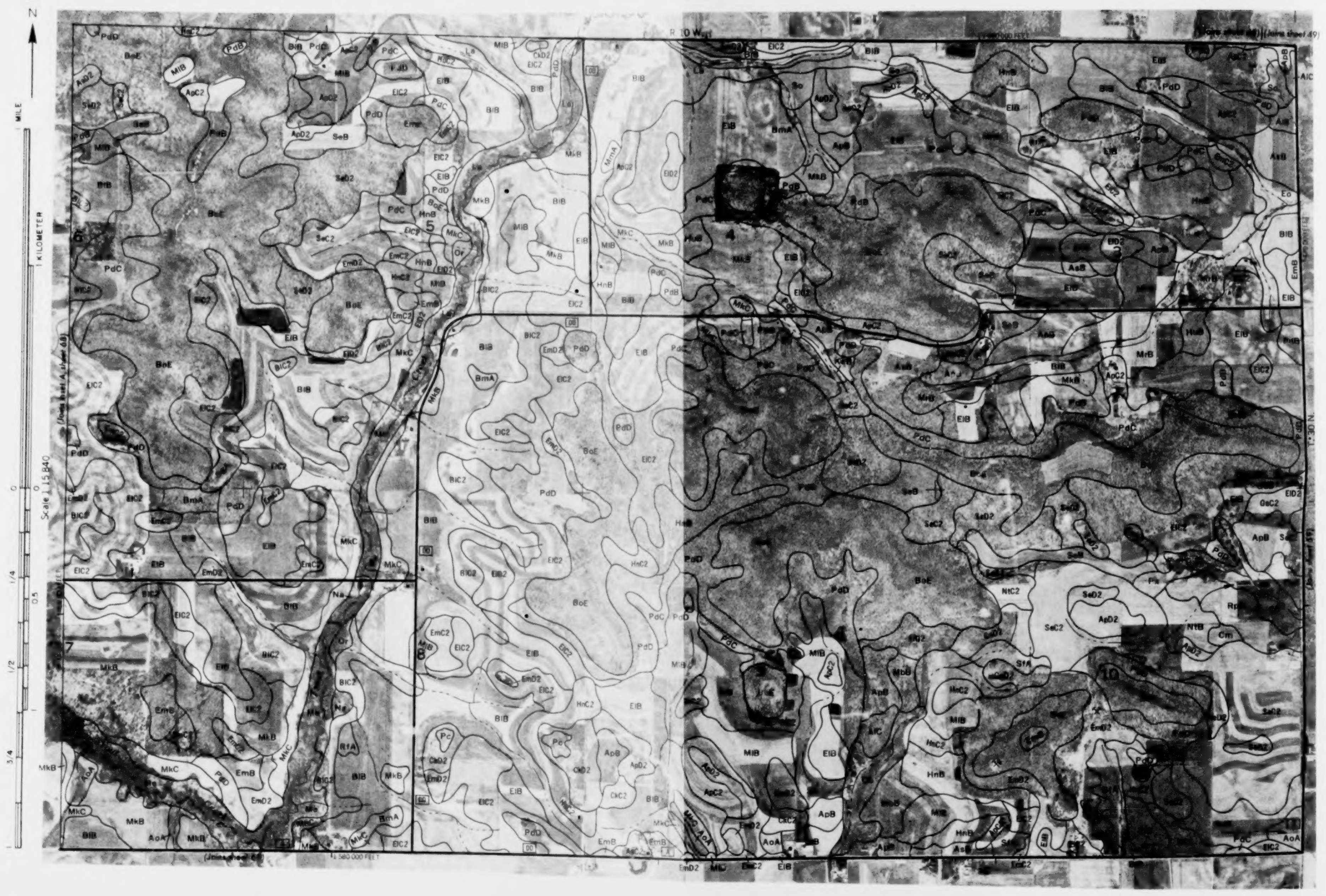
SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 57



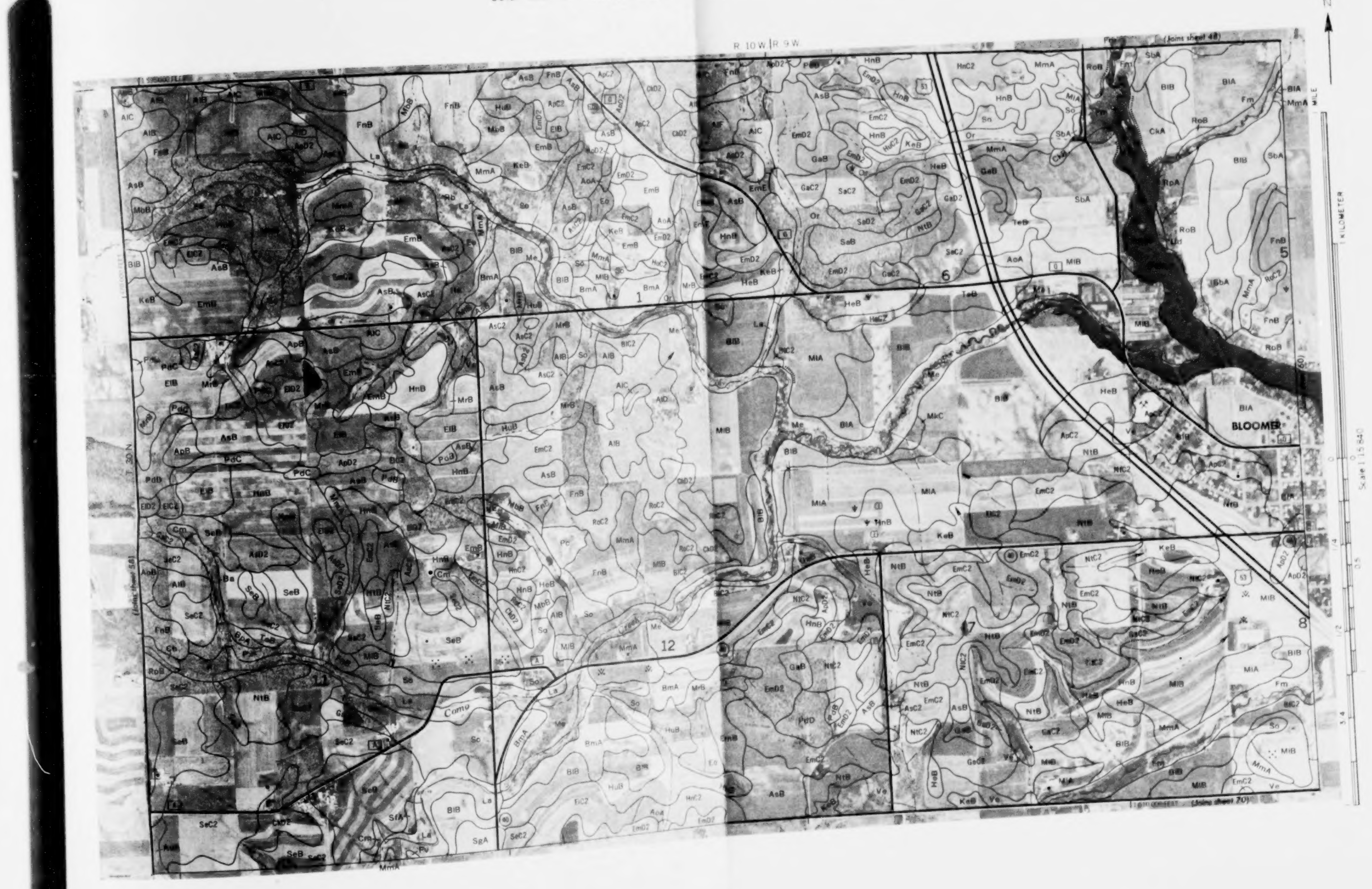
pages tightly bound

best copy available

SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 58


N
MILE
R. 10 W.
(Joins sheet 49)

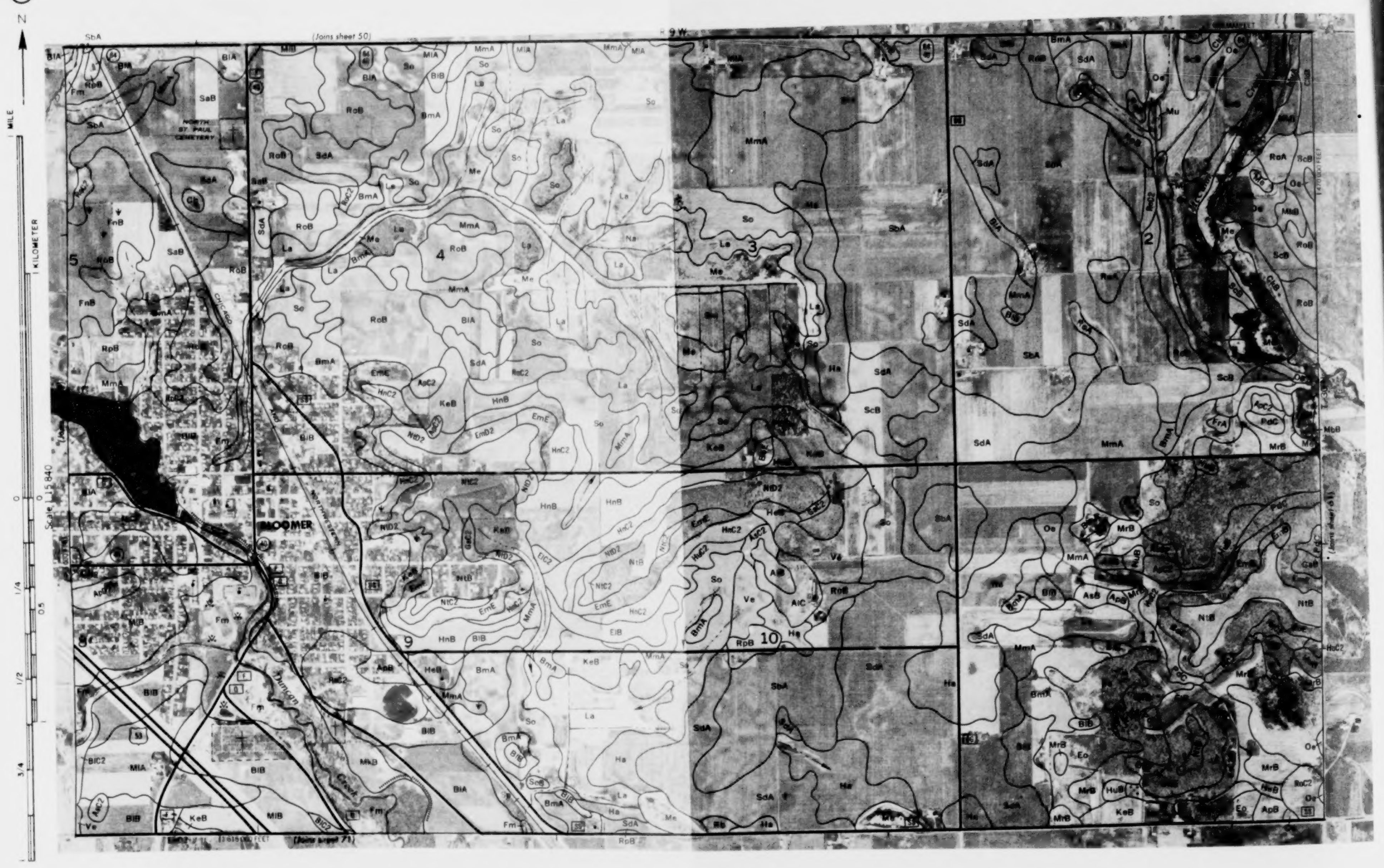
SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 59


N
MILE
KILOMETER
R. 10 W. | R. 9 W.
(Joins sheet 48)
BLOOMER
12

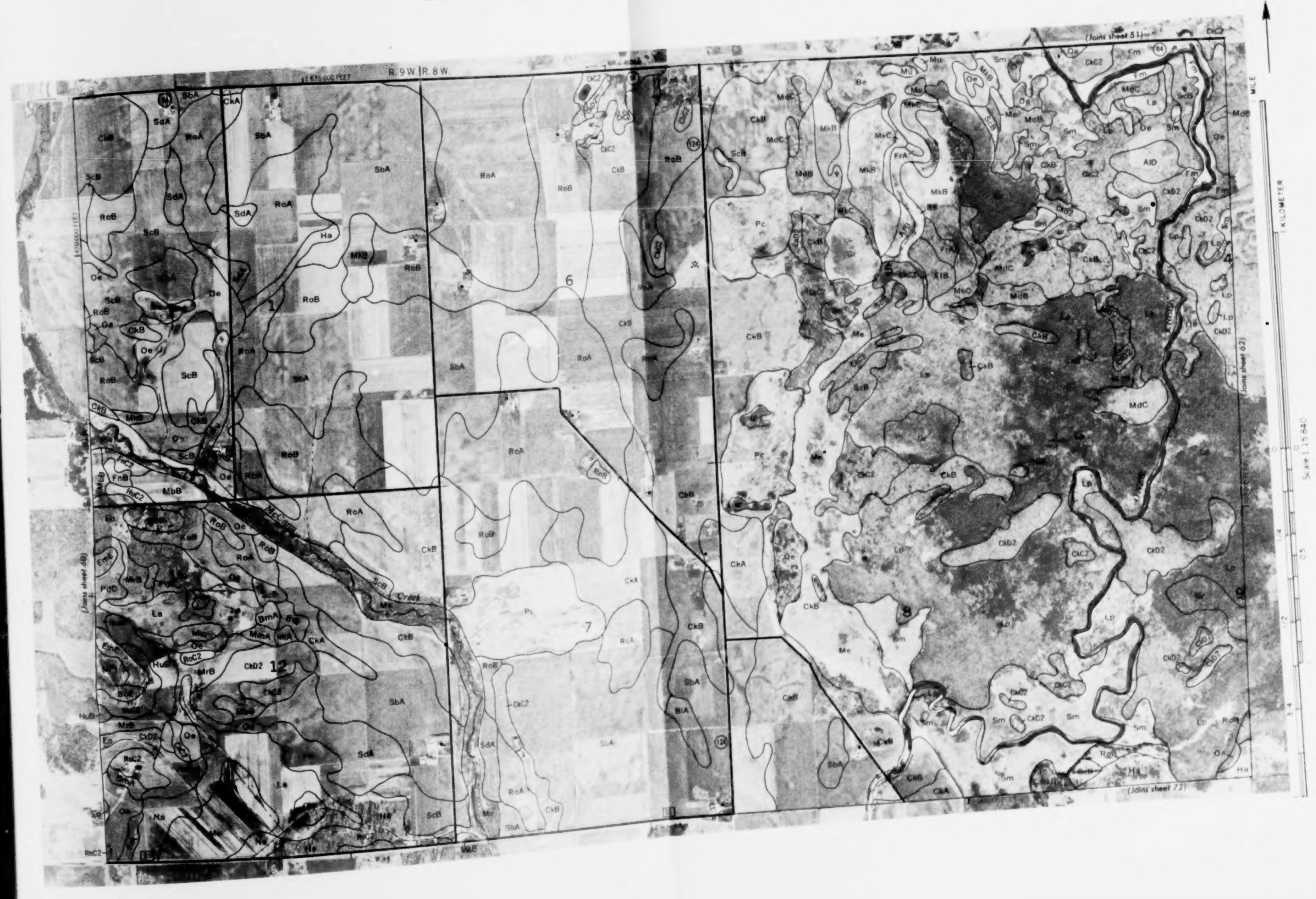
pages tightly bound

best copy available

SOIL MAP OF CHIPPEWA COUNTY, **WISCONSIN — SHEET NUMBER** 60


N
1 MILE
(Joins sheet 50)
R. 9 W.
BLOOMER
NORTH ST. PAUL CEMETERY
(Joins sheet 71)

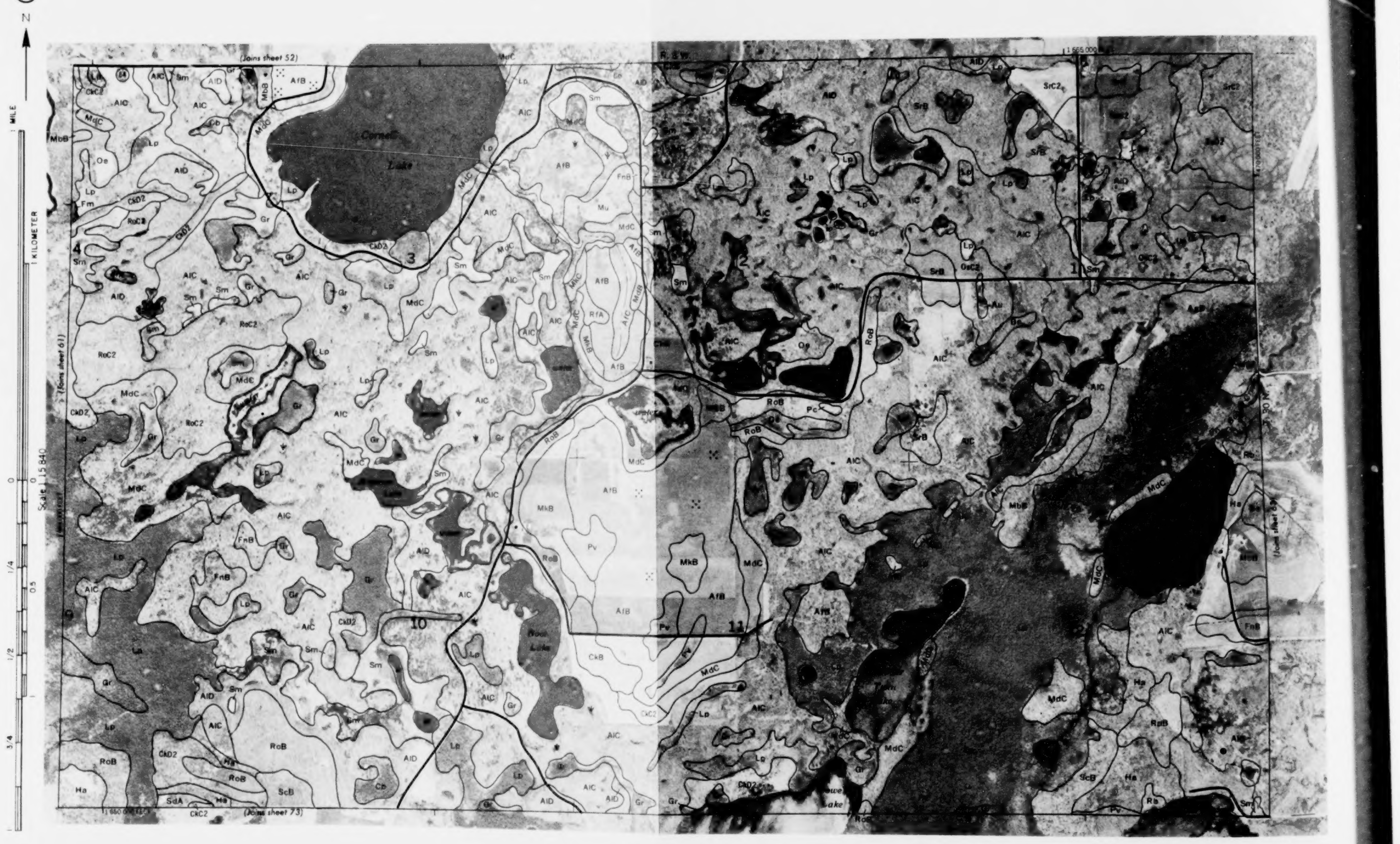
SOIL MAP OF CHIPPEWA COUNTY, **WISCONSIN — SHEET NUMBER** 61


N
MILE
(Joins sheet 51)
R. 9 W.
R. 8 W.
(Joins sheet 72)

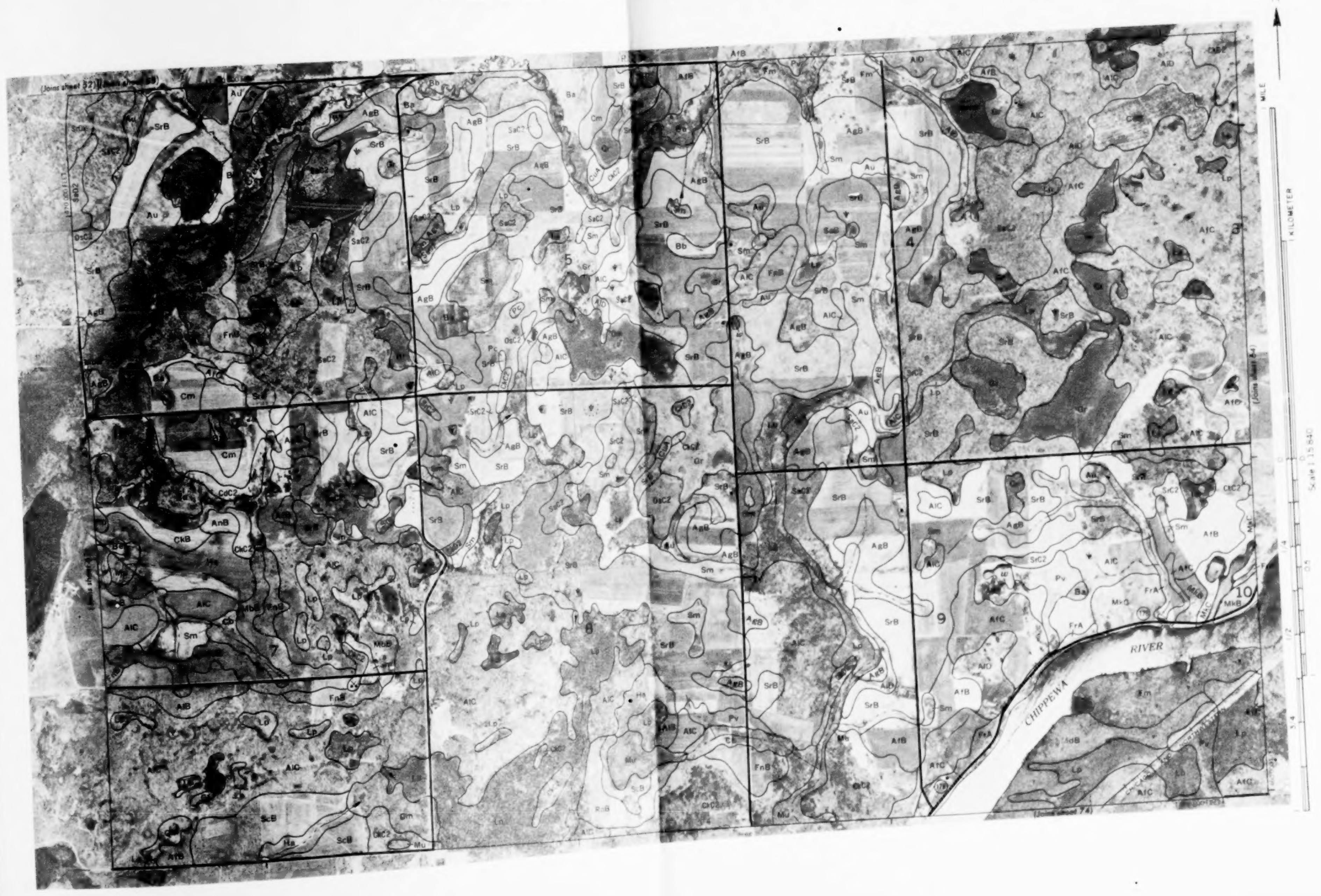
pages tightly bound

best copy available

SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 62


N
MILE
KILOMETER
(Joins sheet 52)
Cornell Lake
(Joins sheet 73)

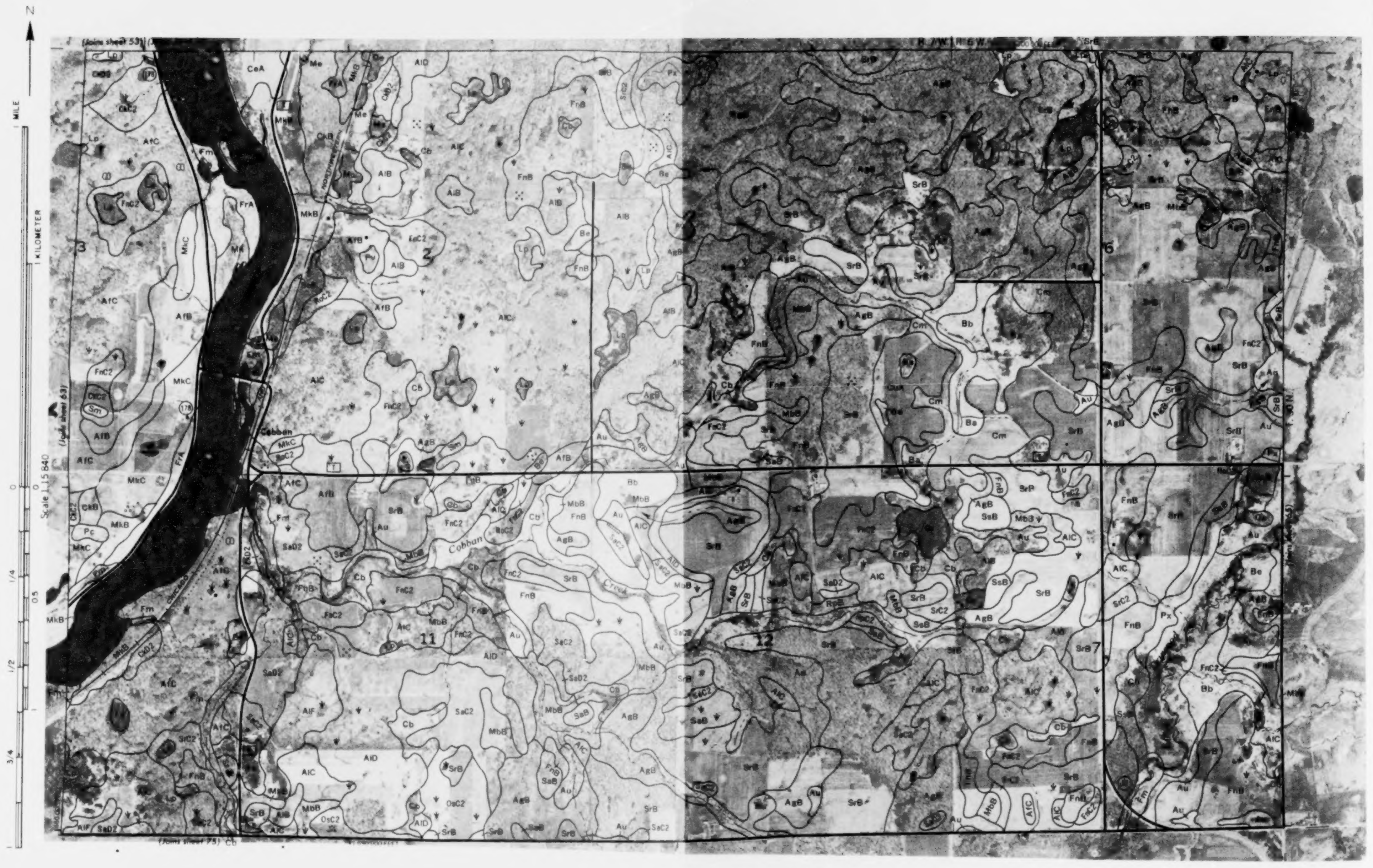
SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 63


N
MILE
KILOMETER
CHIPPEWA
RIVER

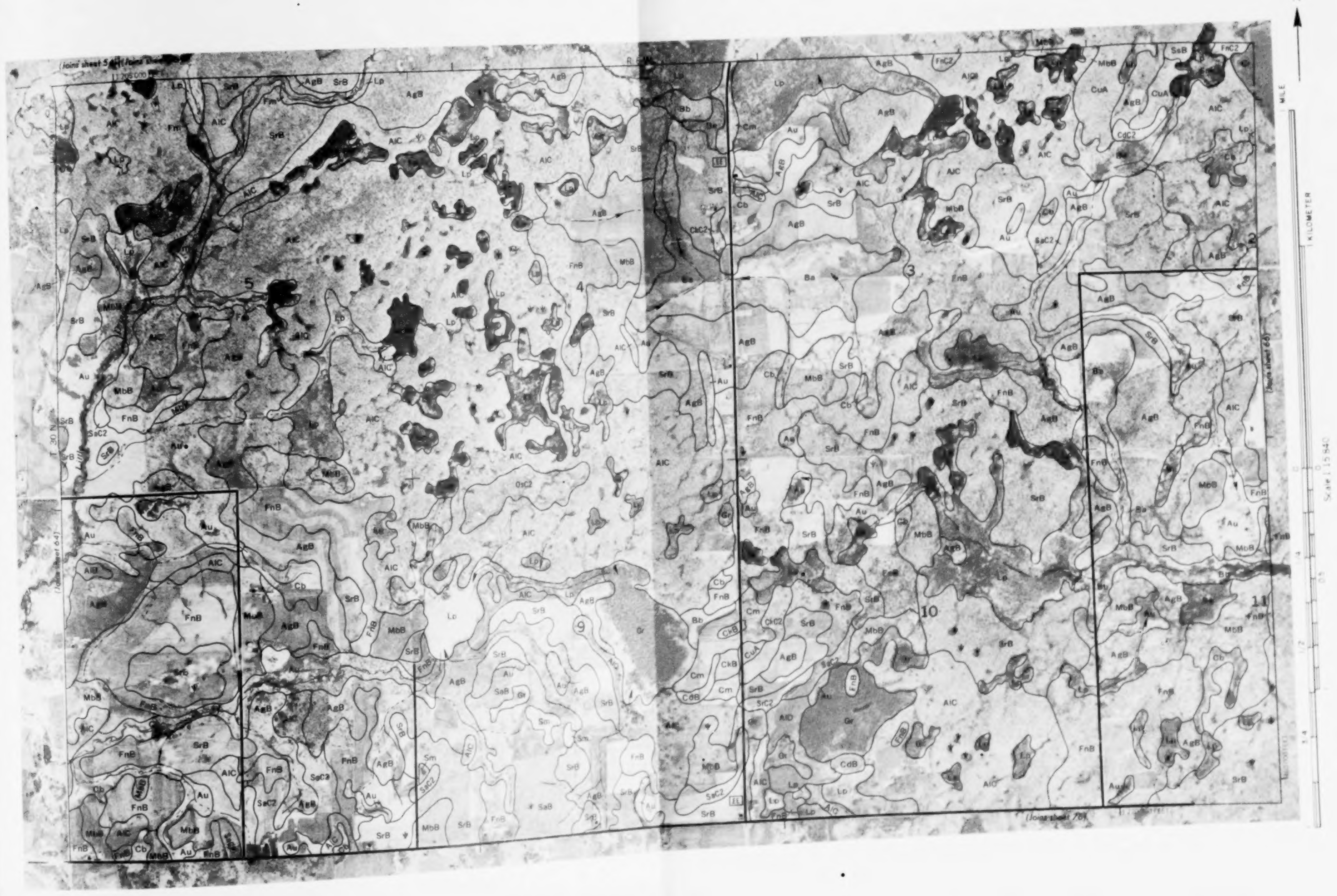
pages tightly bound

best copy available

SOIL MAP OF CHIPPEWA COUNTY, **WISCONSIN — SHEET NUMBER 64**


N
MILE
KILOMETER
(Joins sheet 53)

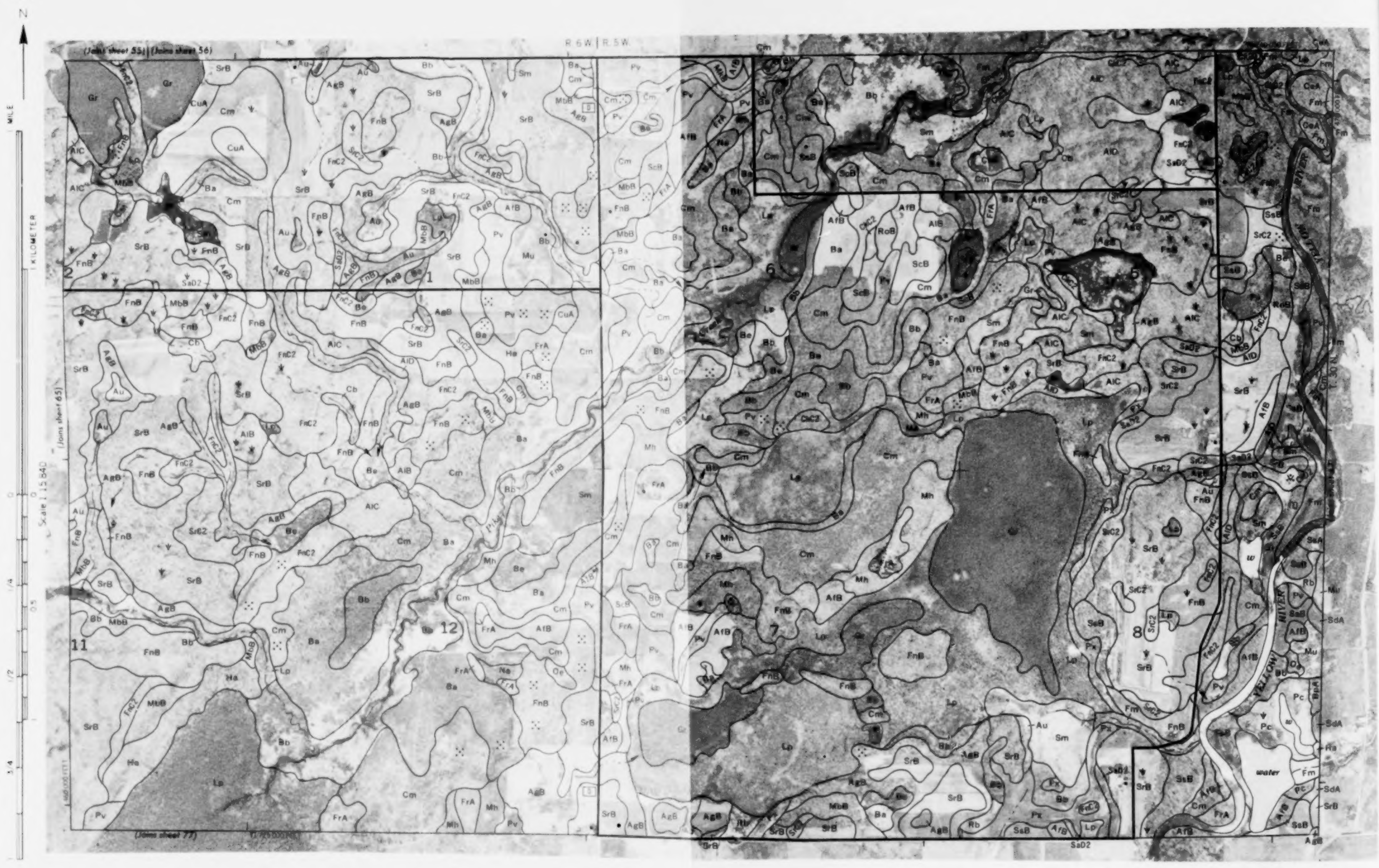
SOIL MAP OF CHIPPEWA COUNTY, **WISCONSIN — SHEET NUMBER 65**


N
MILE
KILOMETER

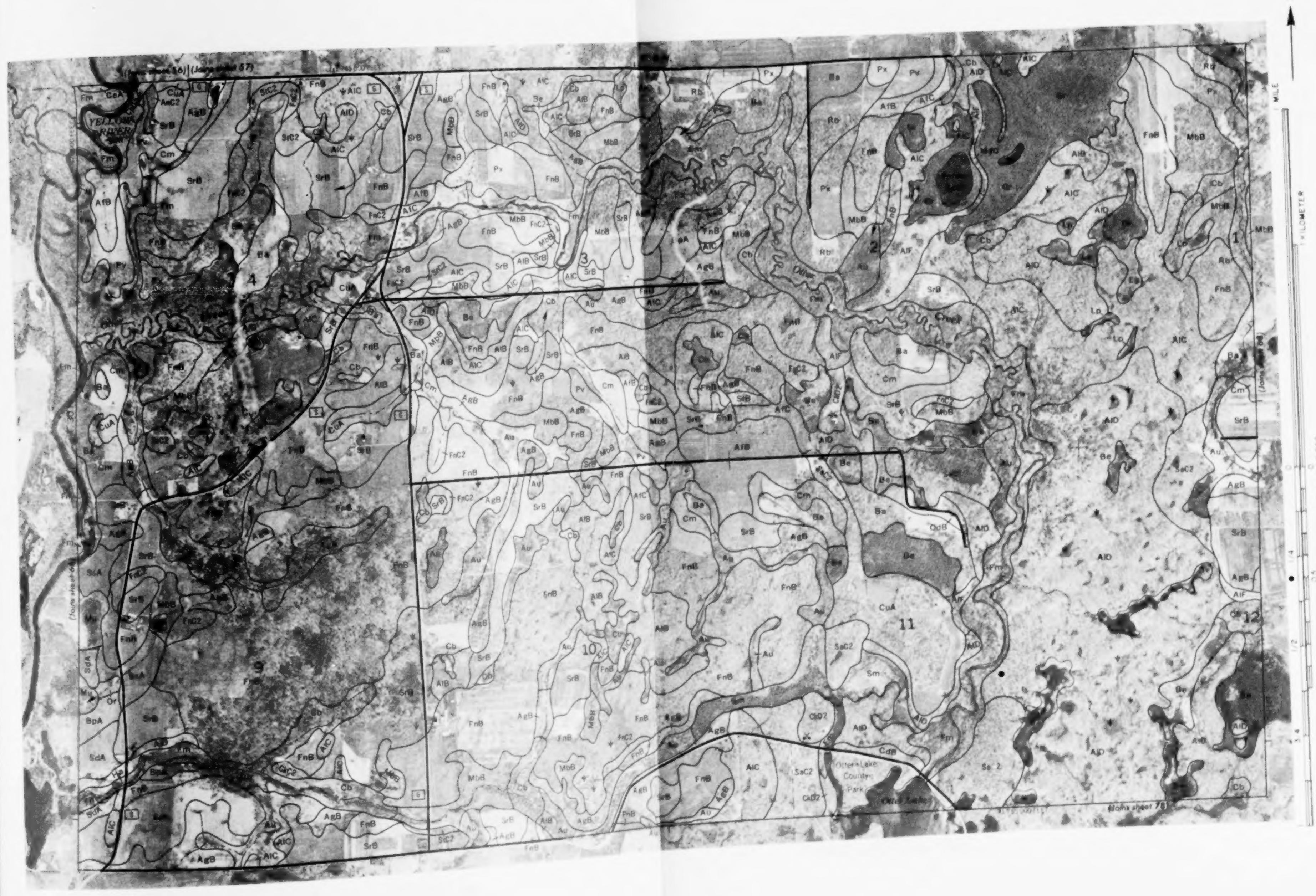
pages tightly bound

best copy available

SOIL MAP OF CHIPPEWA COUNTY WISCONSIN — SHEET NUMBER 66



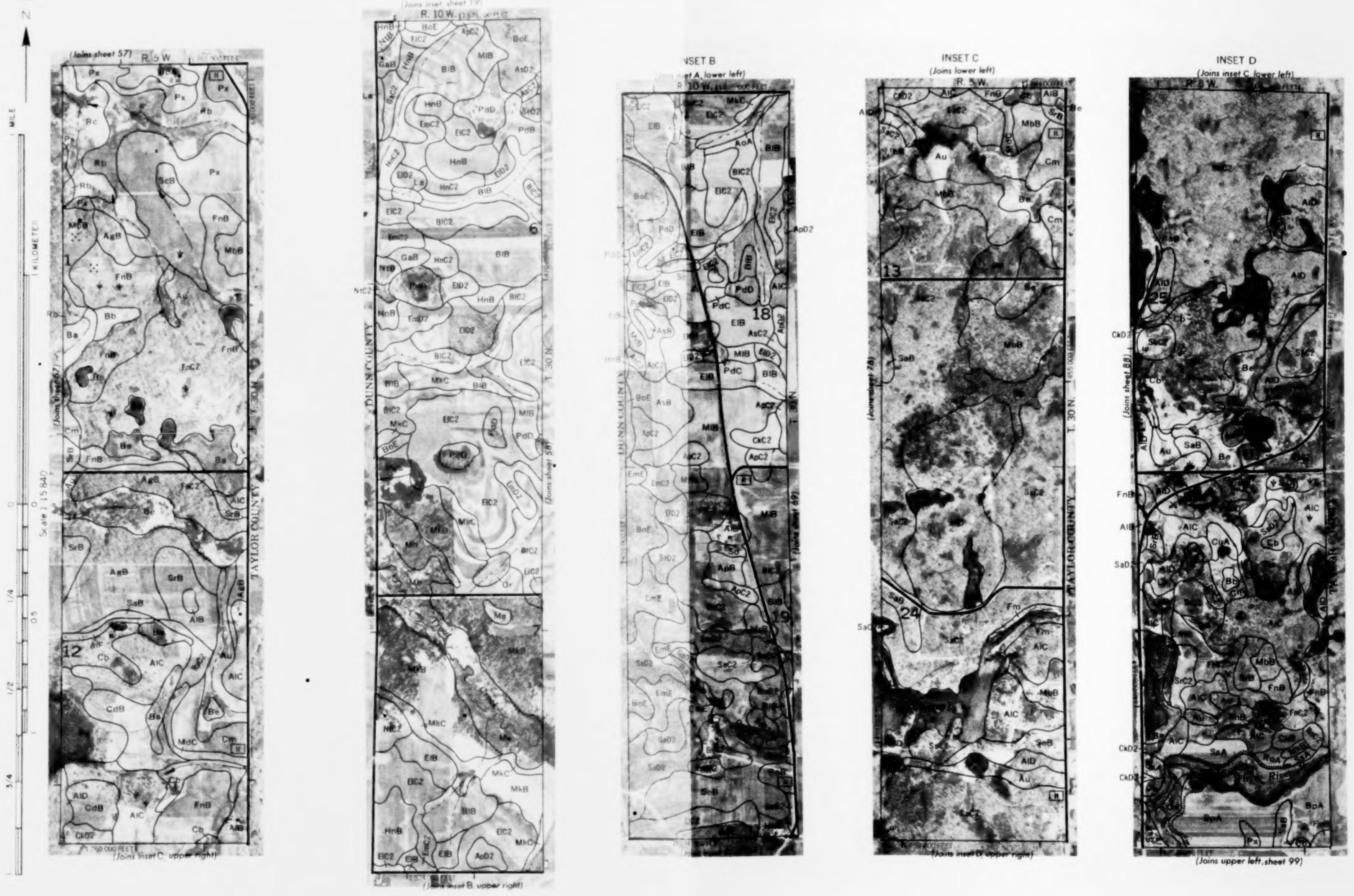
SOIL MAP OF CHIPPEWA COUNTY WISCONSIN — SHEET NUMBER 67



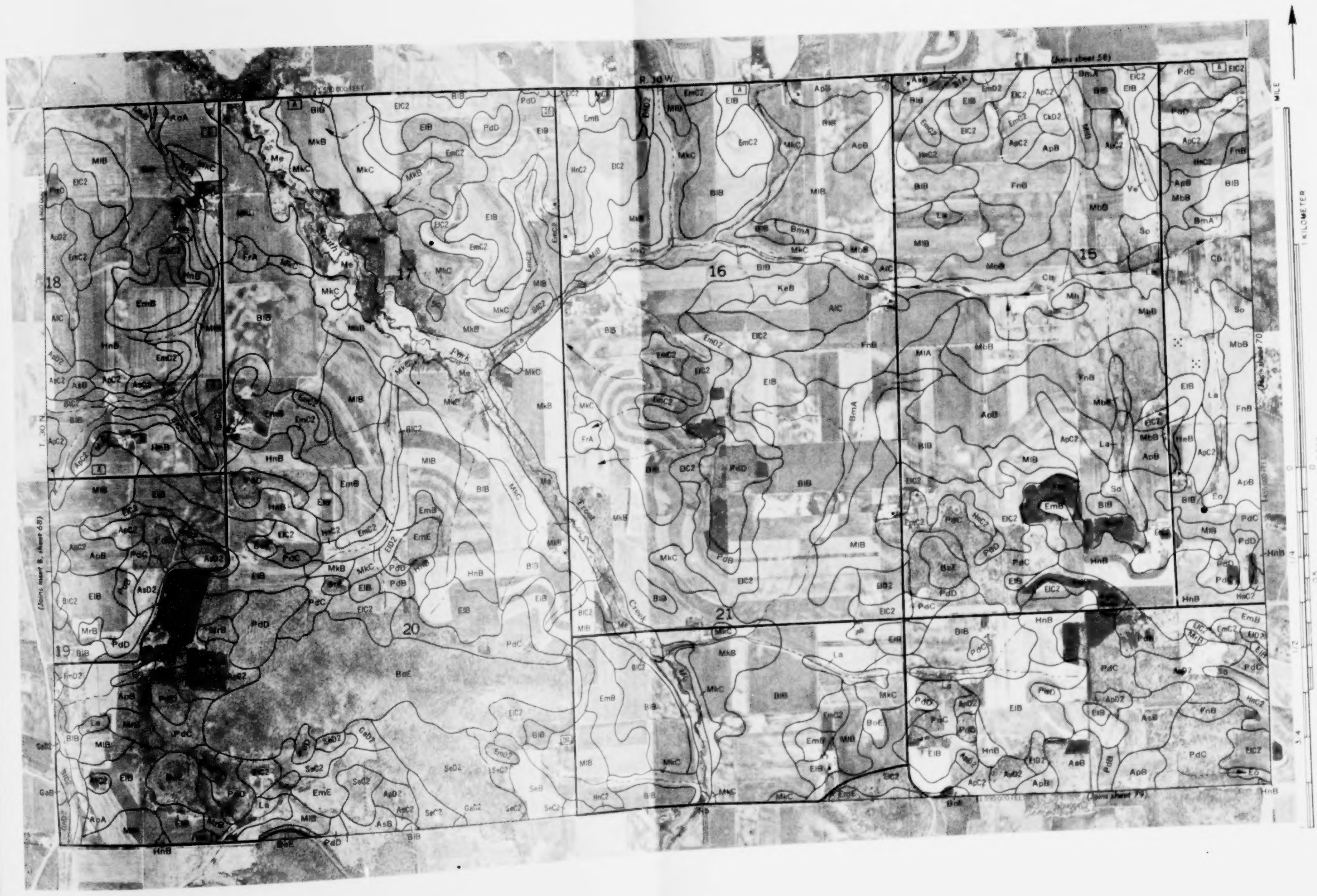
pages tightly bound

best copy available

SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 68


N
INSET A
INSET B
INSET C
INSET D
R. 10 W.
TAYLOR COUNTY
12
18
13
24
(Joins upper left, sheet 99)

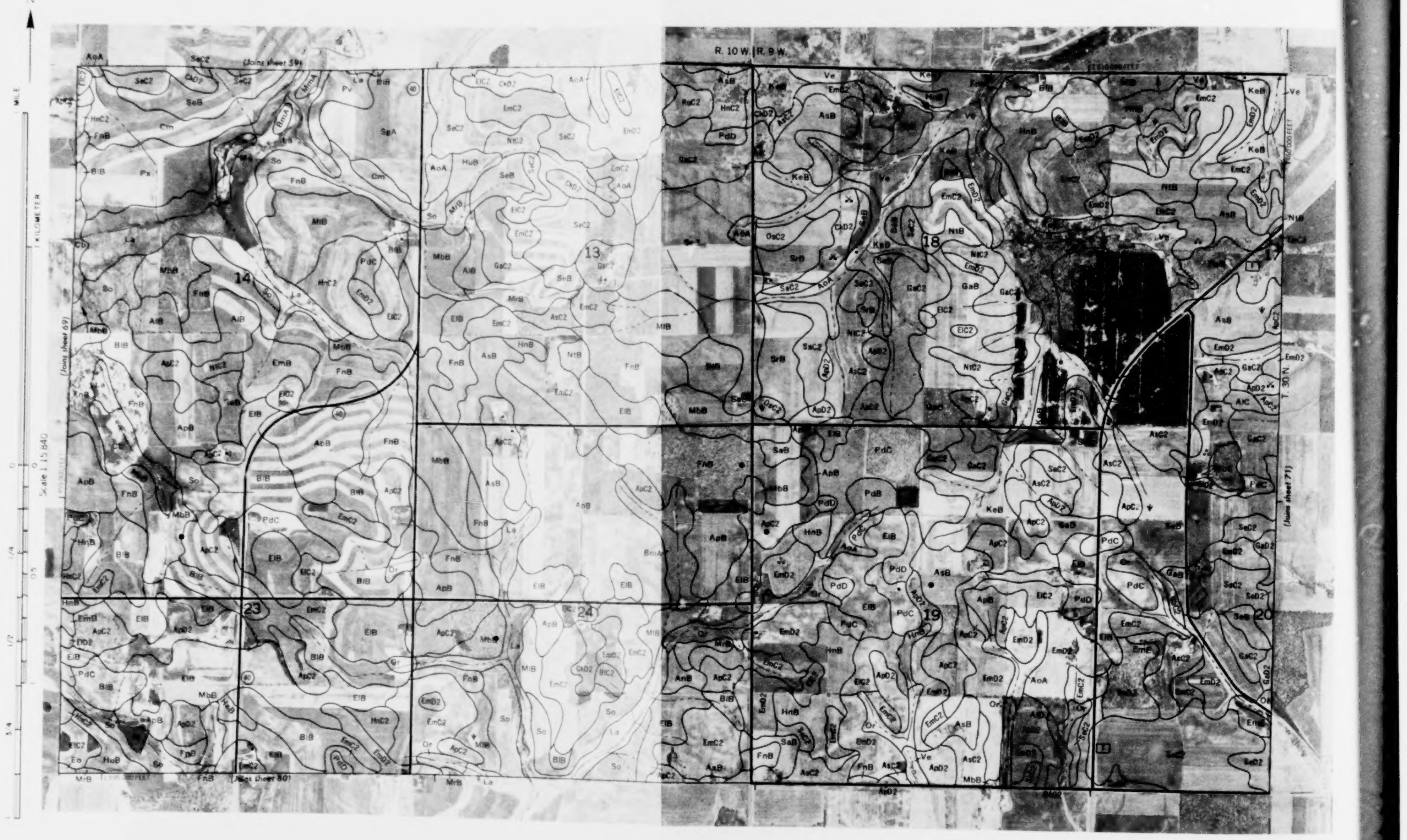
SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 69


N
(Joins sheet 24)
18
16
15
19
20
21

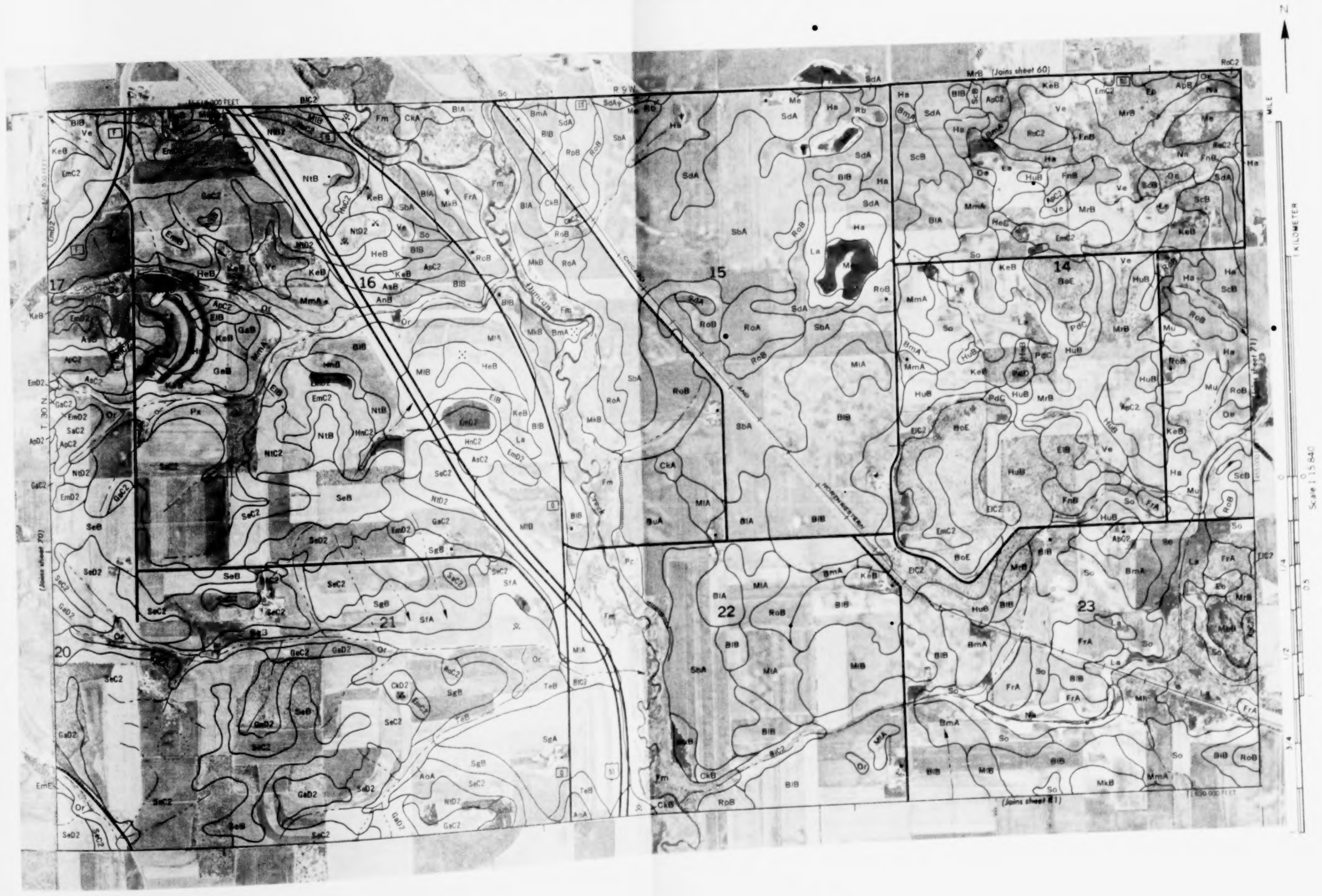
pages tightly bound

best copy available

SOIL MAP OF CHIPPEWA COUNTY WISCONSIN — SHEET NUMBER 70


N
R. 10 W. R. 9 W.
(Joins sheet 59)
(Joins sheet 80)
14
13
18
23
24
19
20

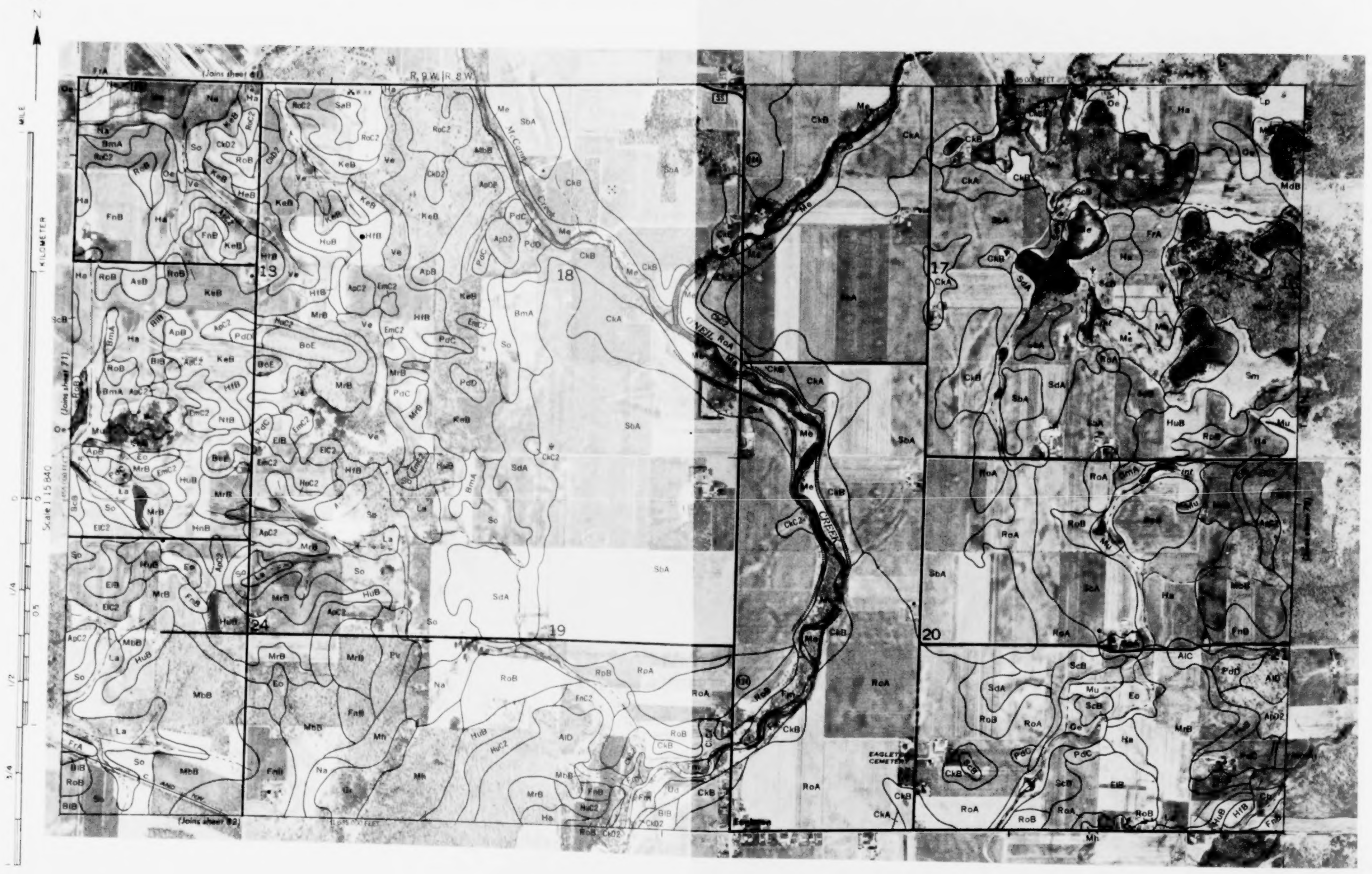
SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 71


N
R 9 W
(Joins sheet 60)
(Joins sheet 81)
17
16
15
14
20
21
22
23

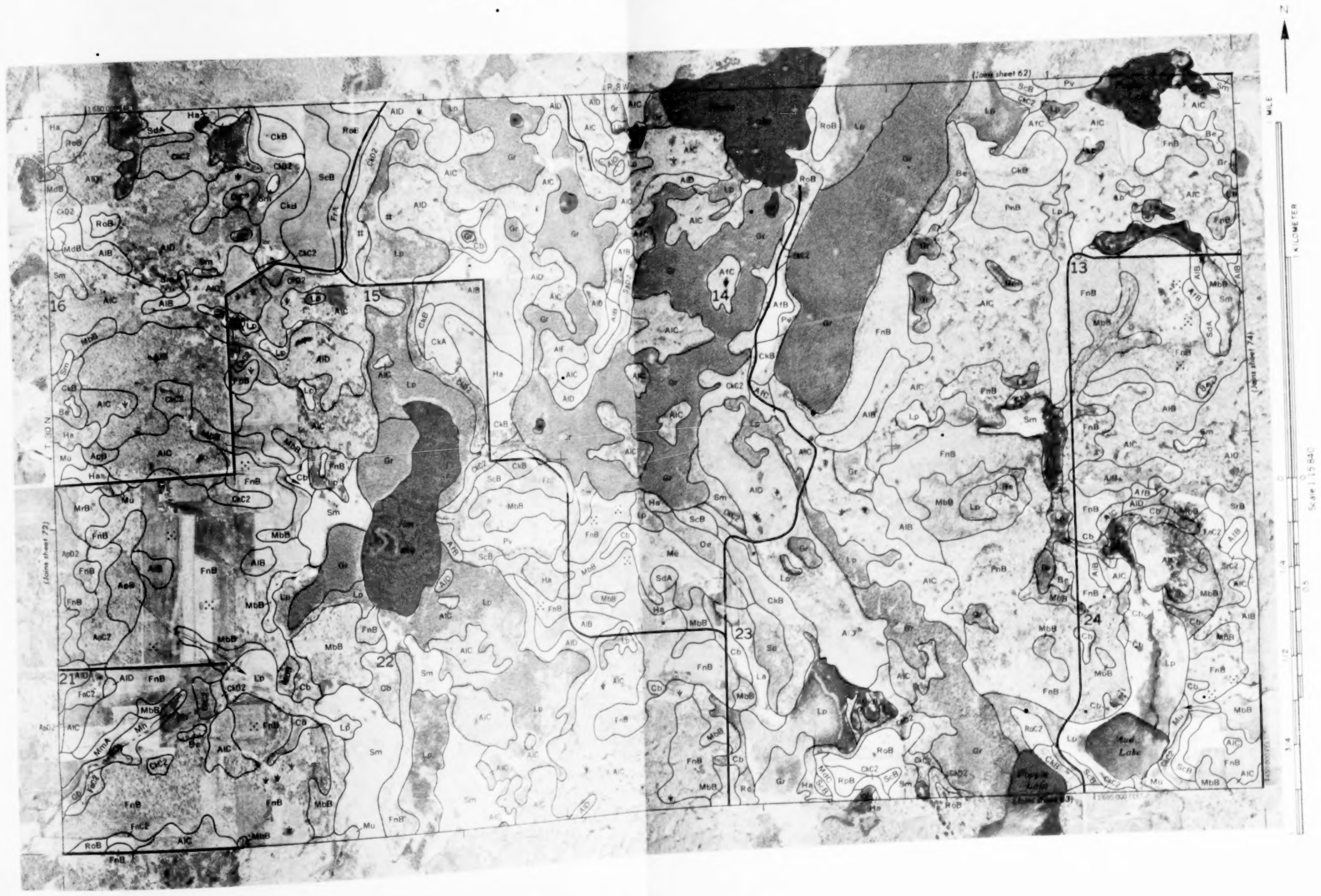
pages tightly bound

best copy available

SOIL MAP OF CHIPPEWA COUNTY WISCONSIN — SHEET NUMBER 72


N
(Joins sheet 61)
R. 9 W. | R. 8 W.
13
18
17
24
19
20
EAGLETON CEMETERY
(Joins sheet 71)
(Joins sheet 82)

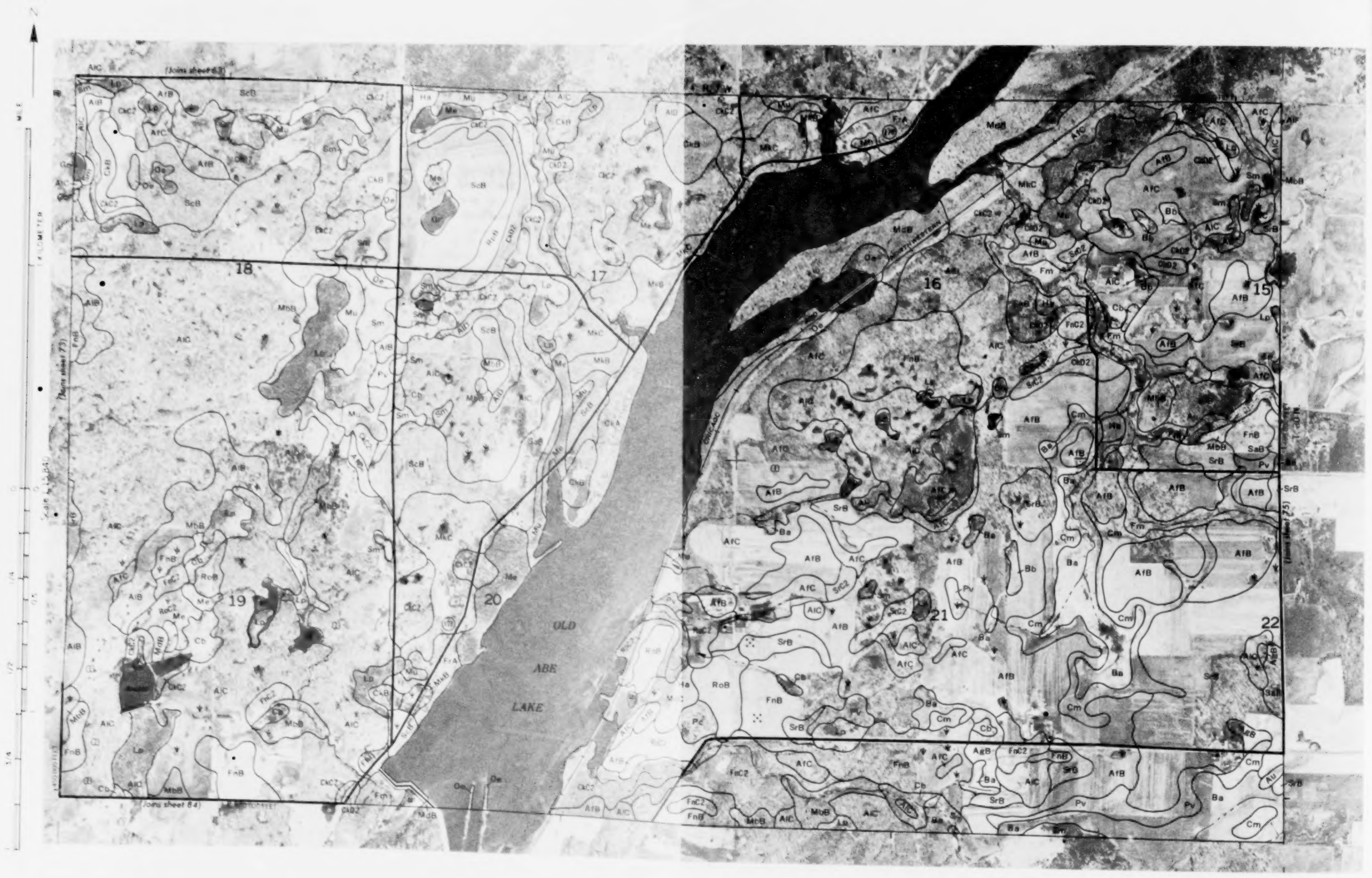
SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 73


N
(Joins sheet 62)
R. 8 W.
16
15
14
13
21
22
23
24
(Joins sheet 72)

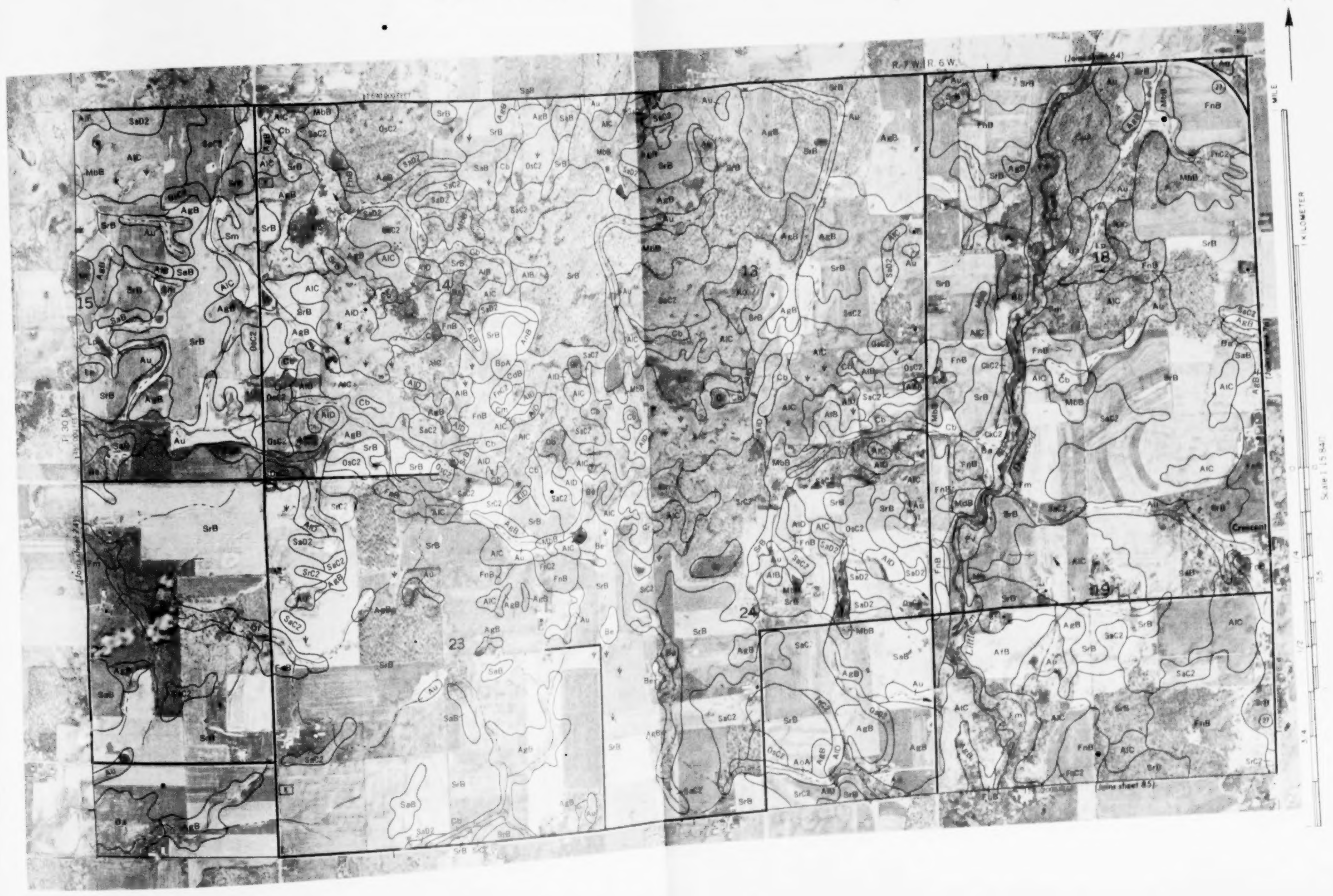
pages tightly bound

best copy available

SOIL MAP OF CHIPPEWA COUNTY WISCONSIN — SHEET NUMBER 74


N
18
17
16
15
19
20
21
22
OLD
ABE
LAKE
(Joins sheet 63)
(Joins sheet 84)

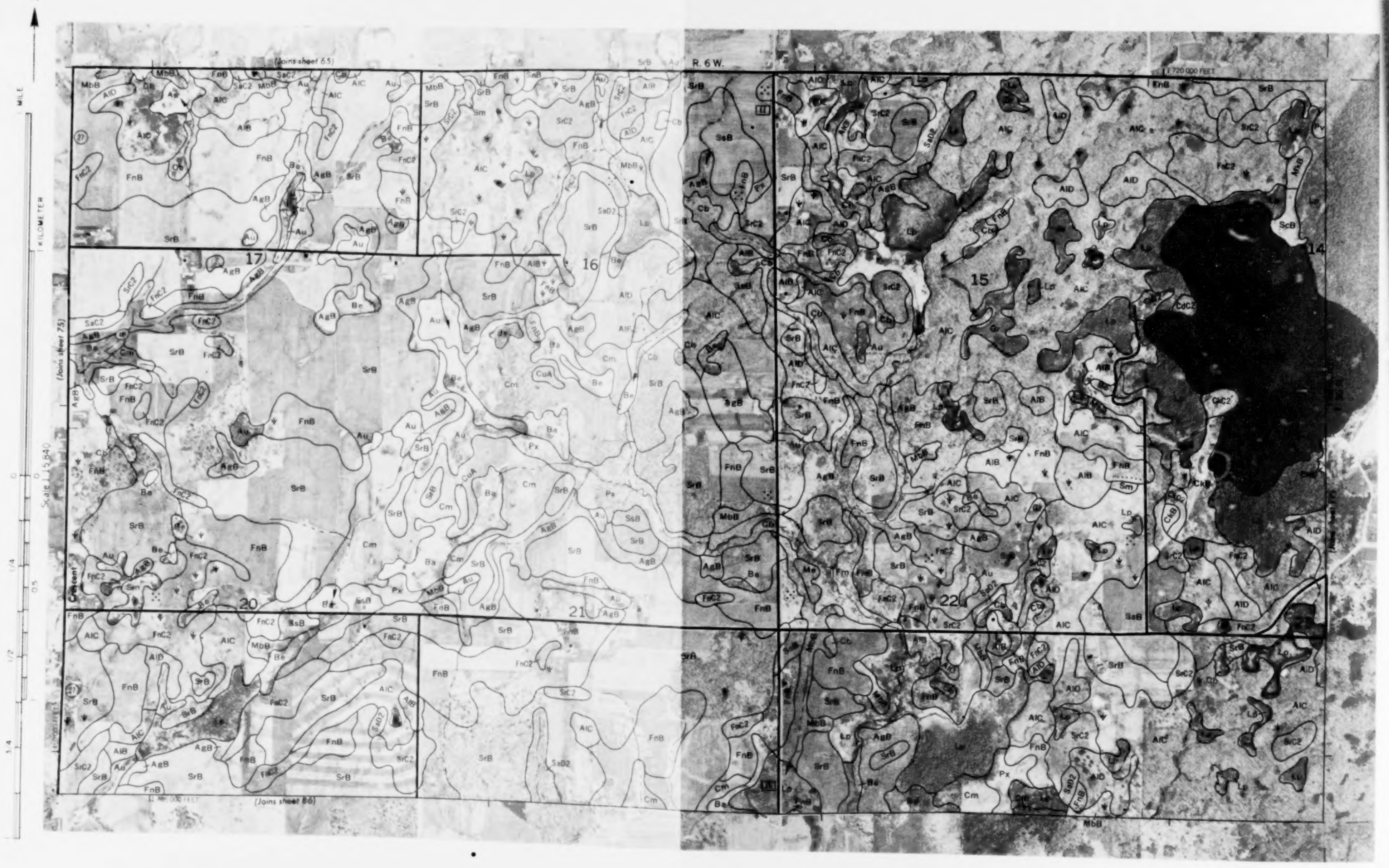
SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 75


N
R. 7 W. | R. 6 W.
(Joins sheet 64)
15
13
18
23
24
19
(Joins sheet 85)
MILE

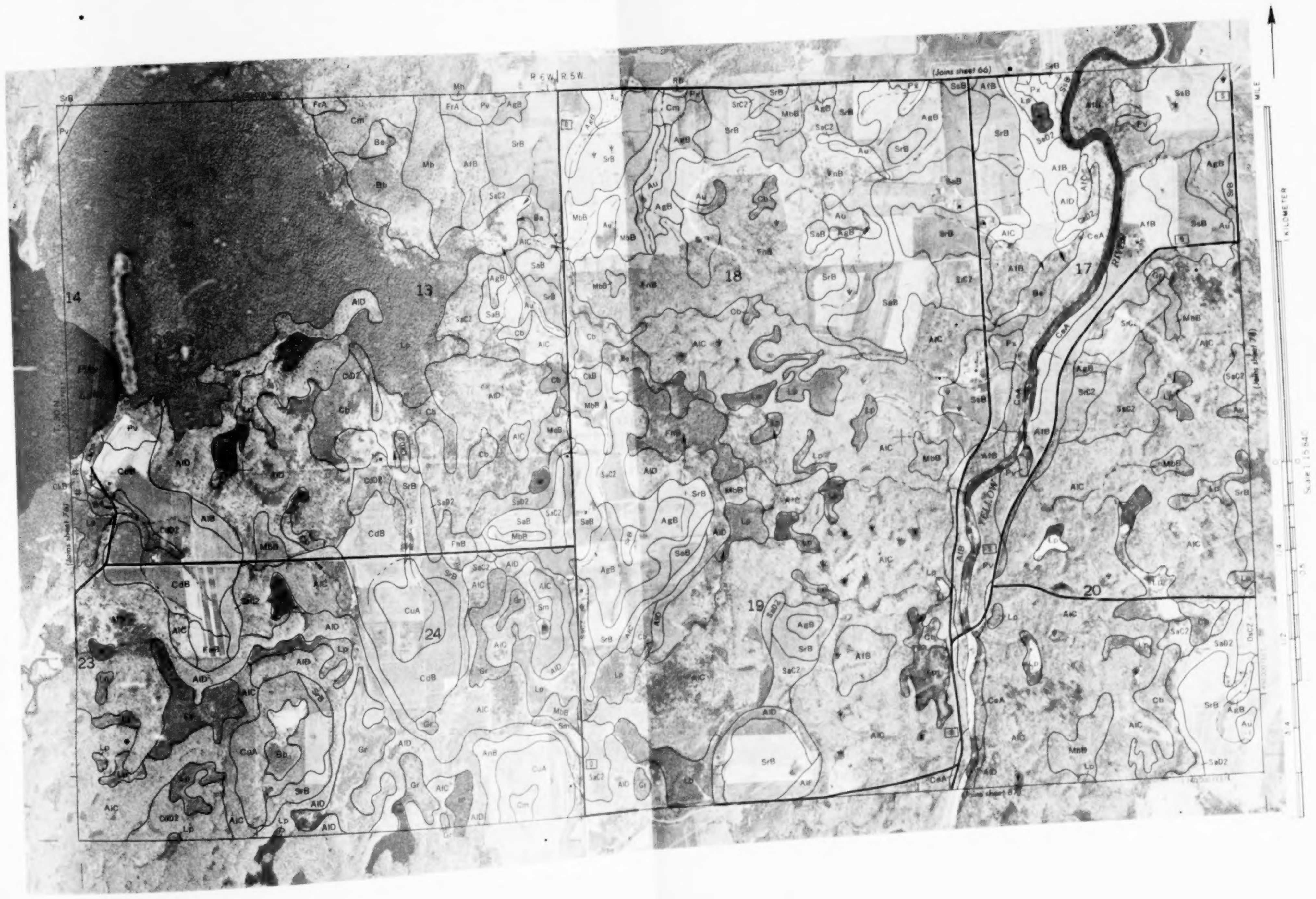
pages tightly bound

best copy available

SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 76


N
R. 6 W.
17
16
15
14
20
21
22
(Joins sheet 61)
(Joins sheet 75)
(Joins sheet 86)

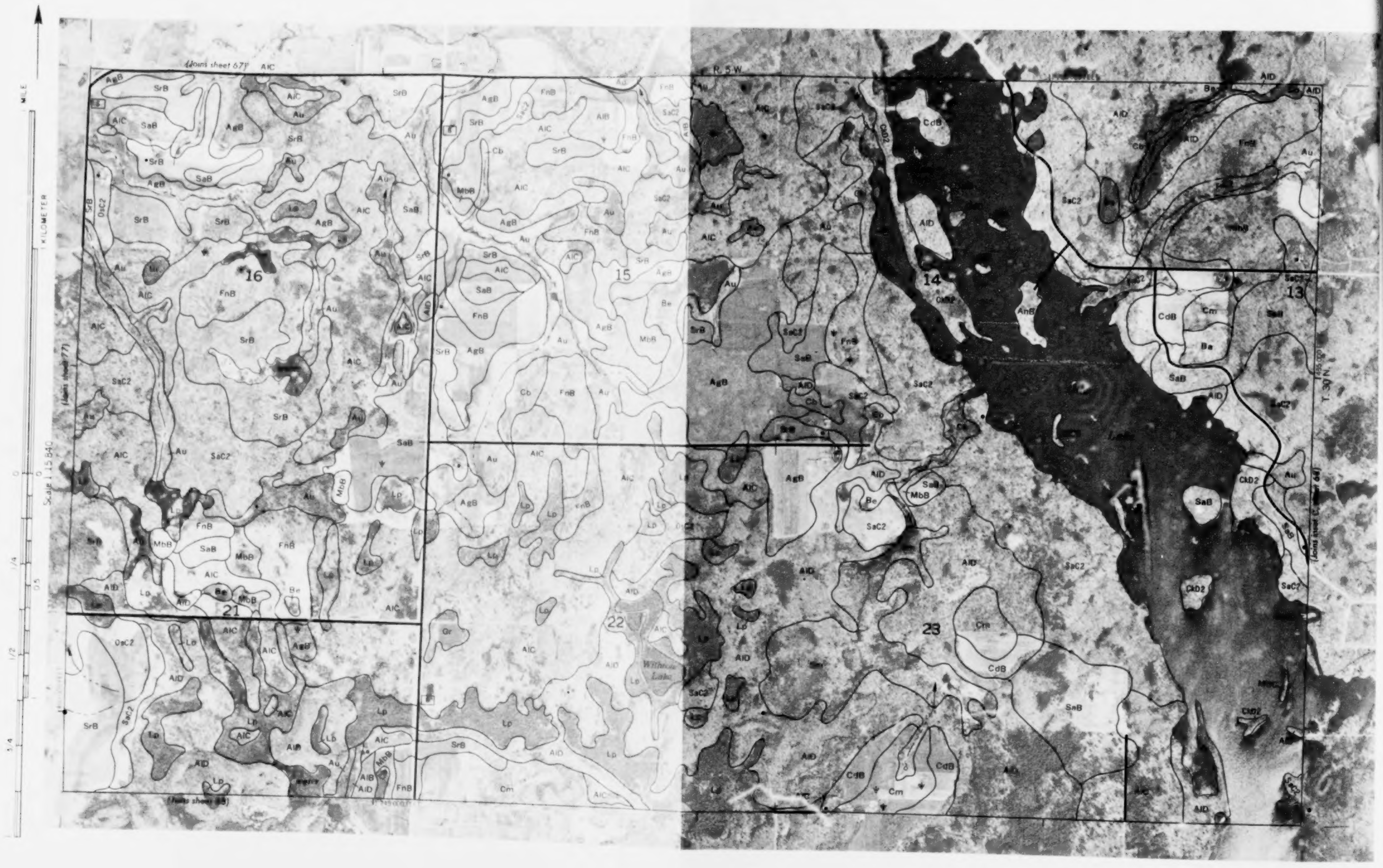
SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 77


N
14
13
18
17
23
24
19
20
(Joins sheet 66)

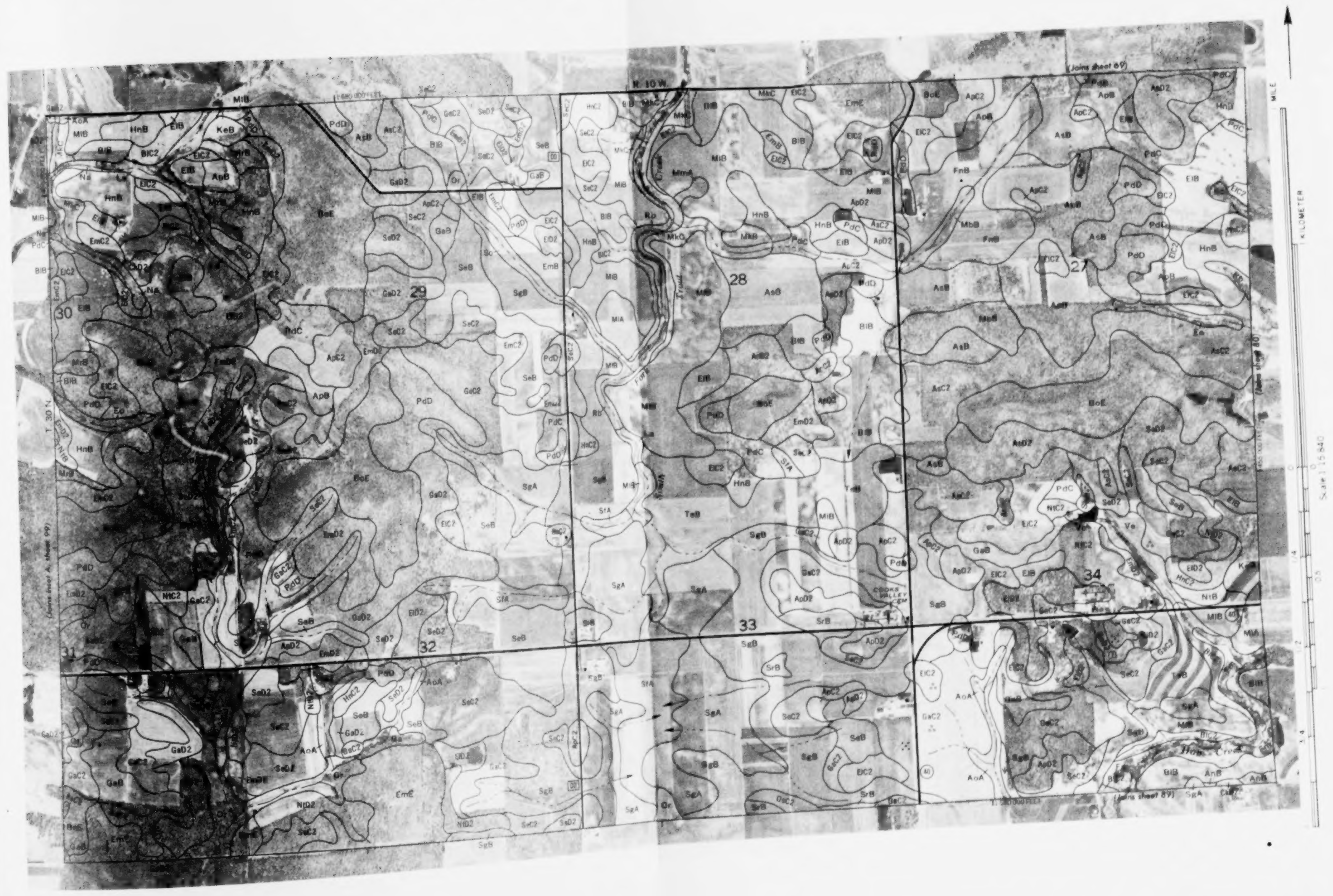
pages tightly bound

best copy available

SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 78


R 5 W
16
15
14
13
22
23

SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 79

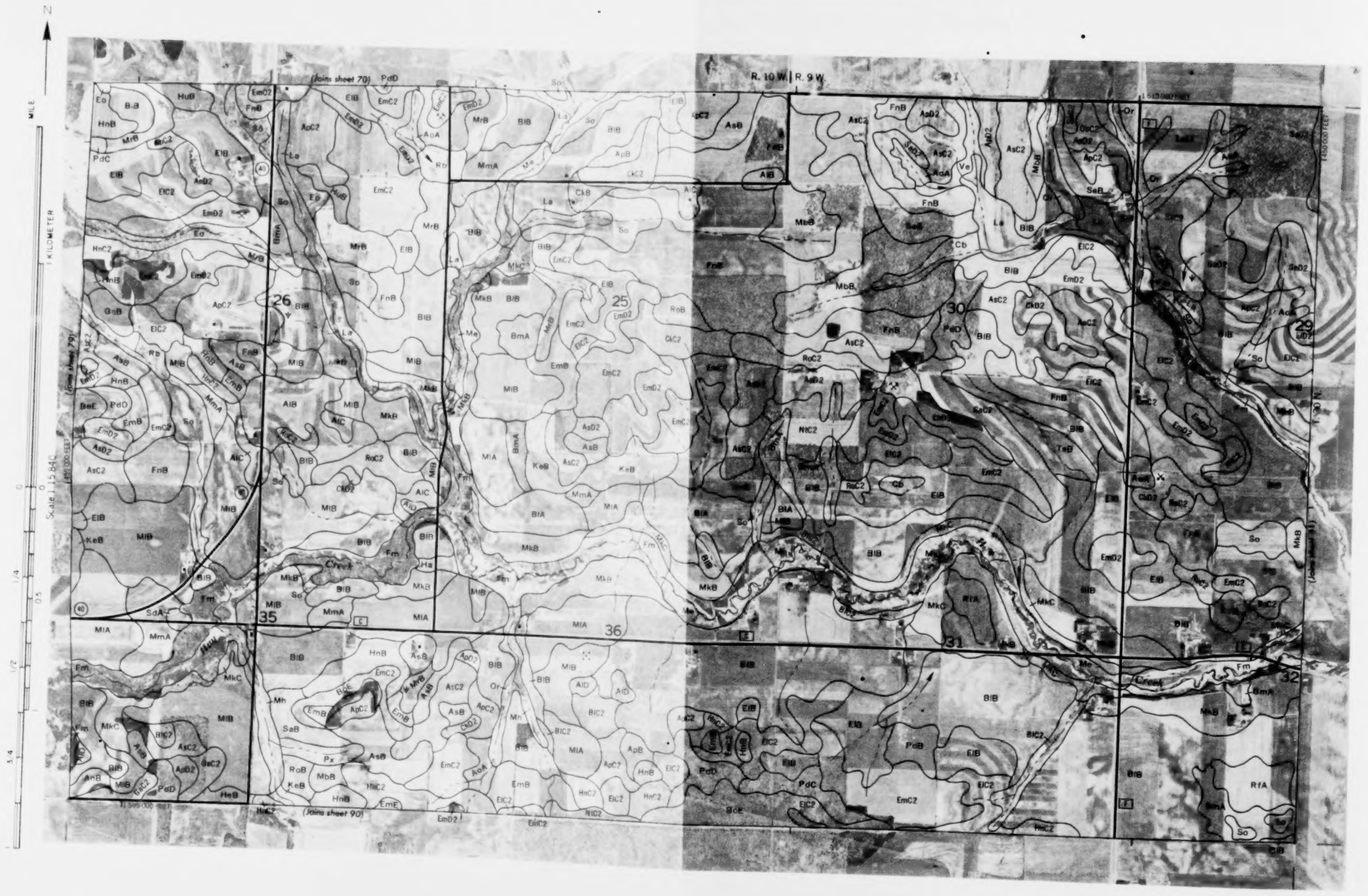

R 10 W
30
29
28
27
32
33
34

pages tightly bound

best copy available

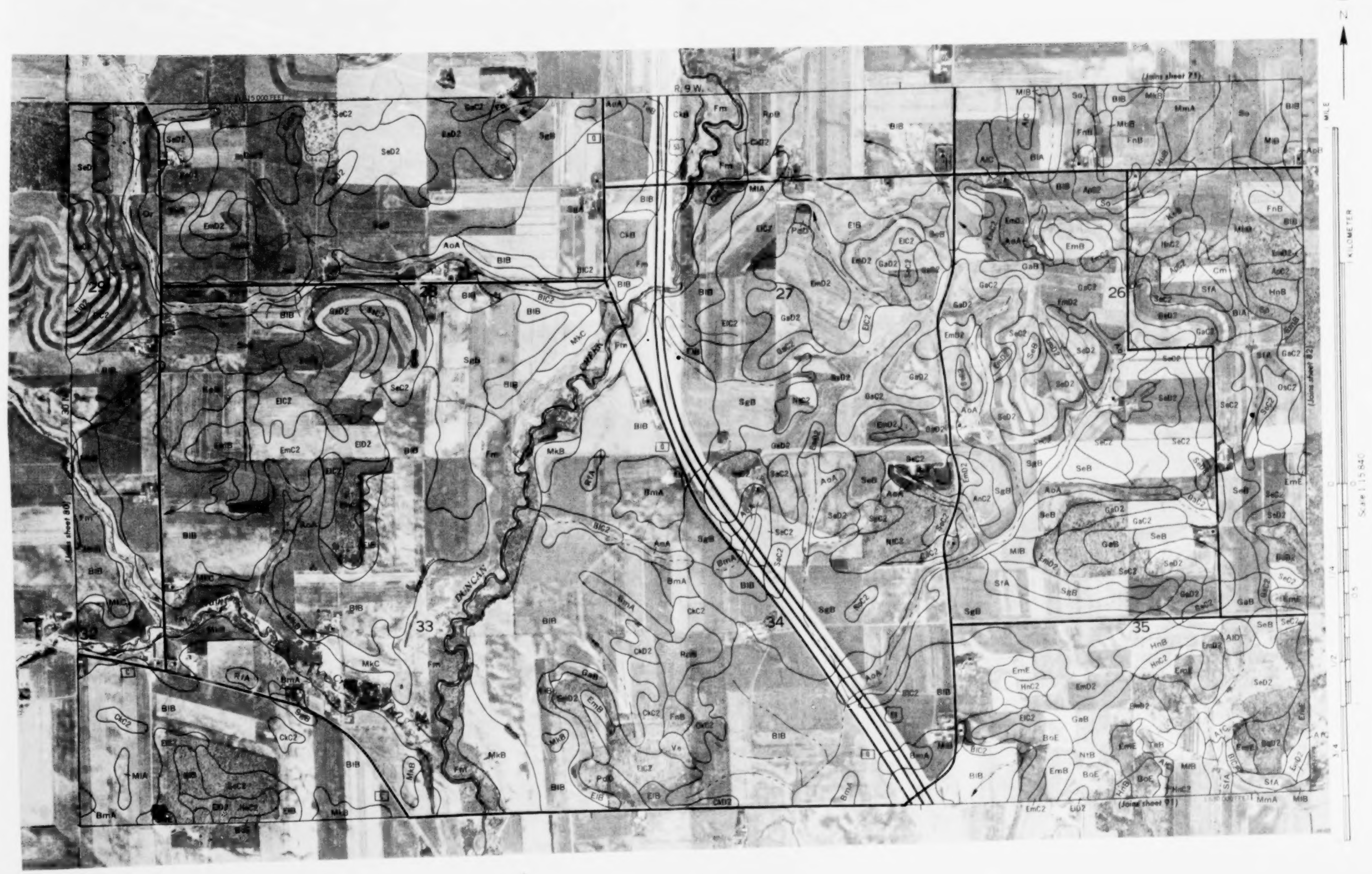
⑧⓪

SOIL MAP OF CHIPPEWA COUNTY WISCONSIN — SHEET NUMBER 80


R. 10 W. | R. 9 W.
26
25
30
29
35
36
31

SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 81

⑧①

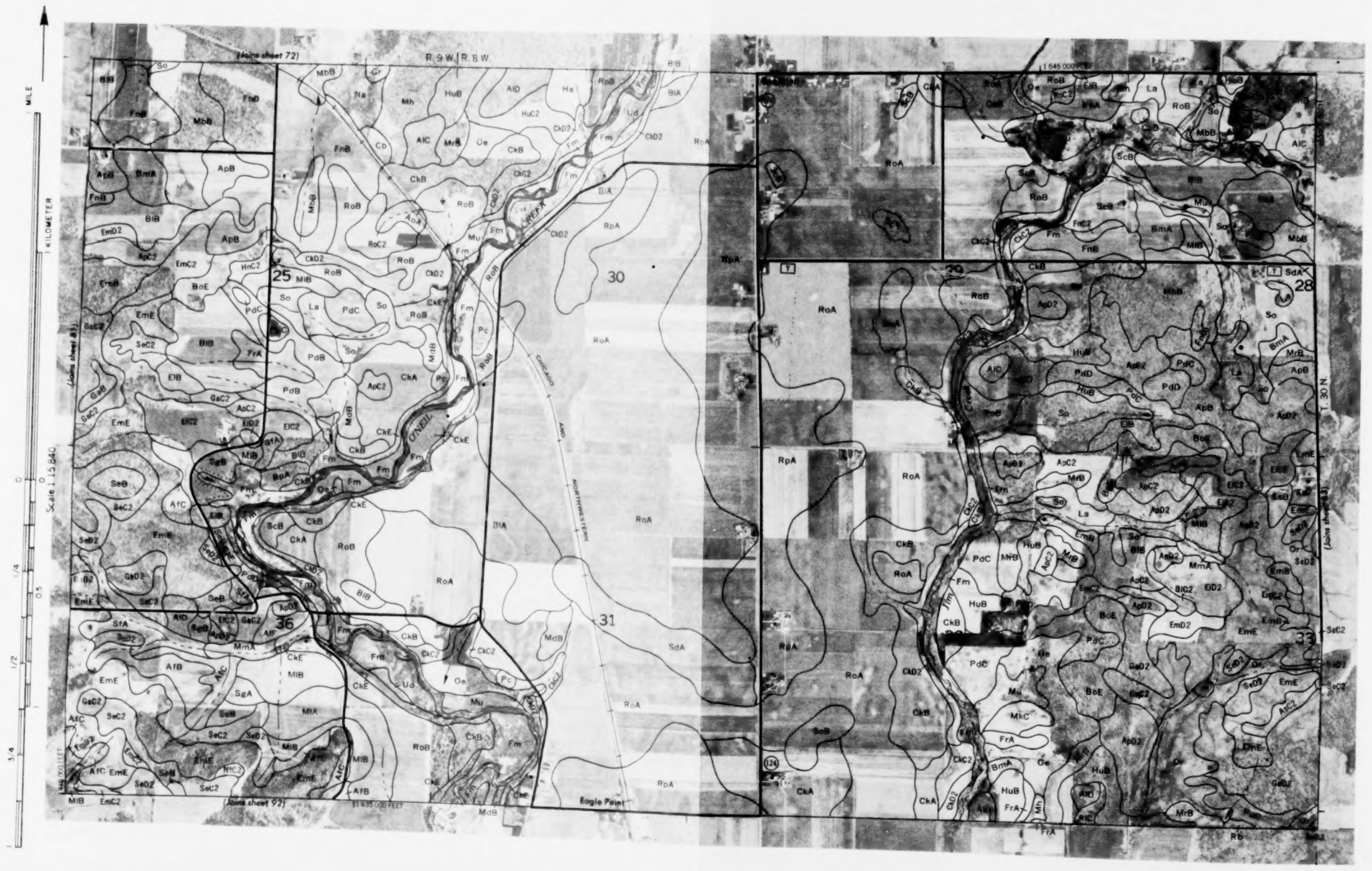

27
26
33
34
35

pages tightly bound

best copy available

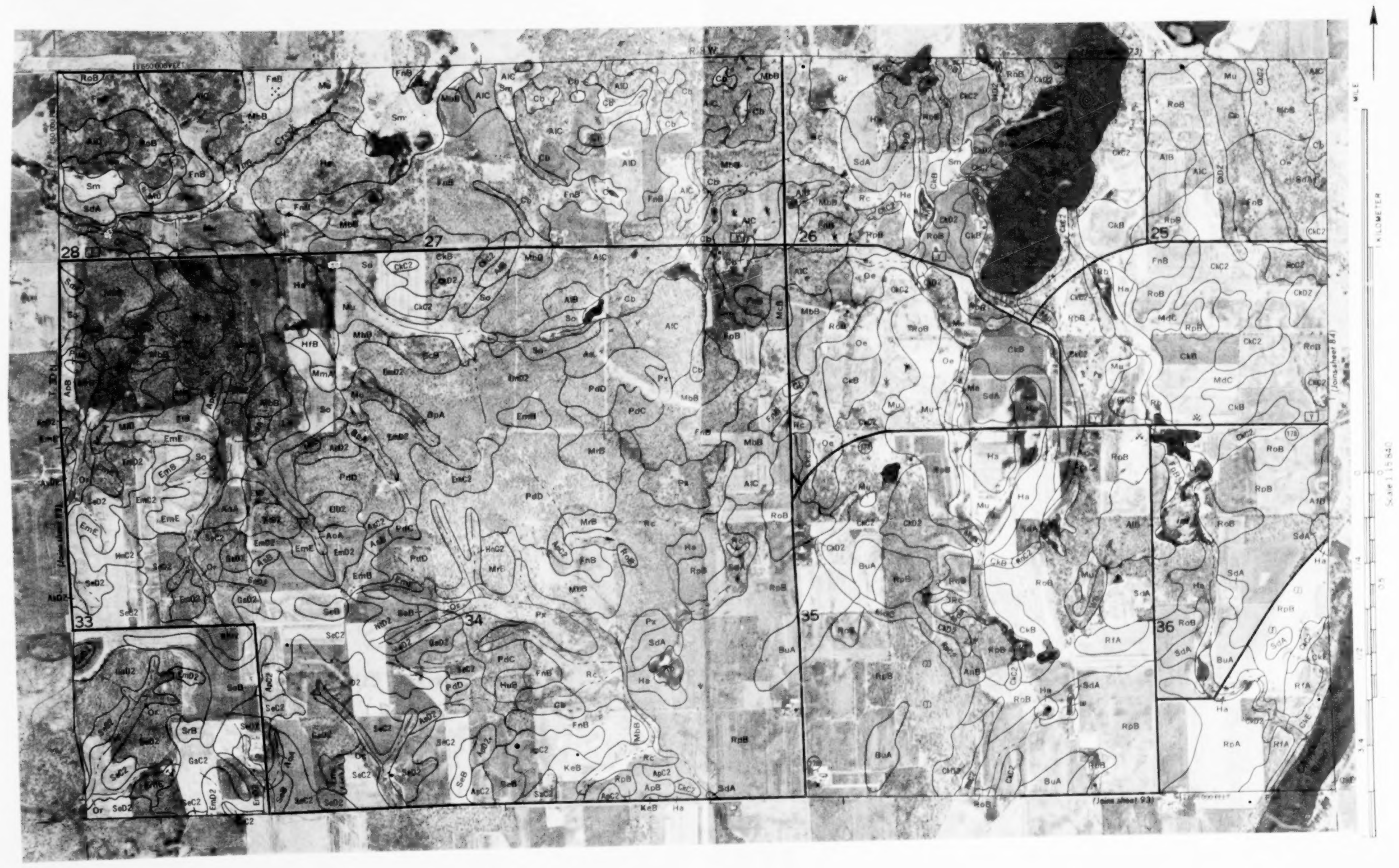
82

SOIL MAP OF CHIPPEWA COUNTY WISCONSIN — SHEET NUMBER 82



SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 83

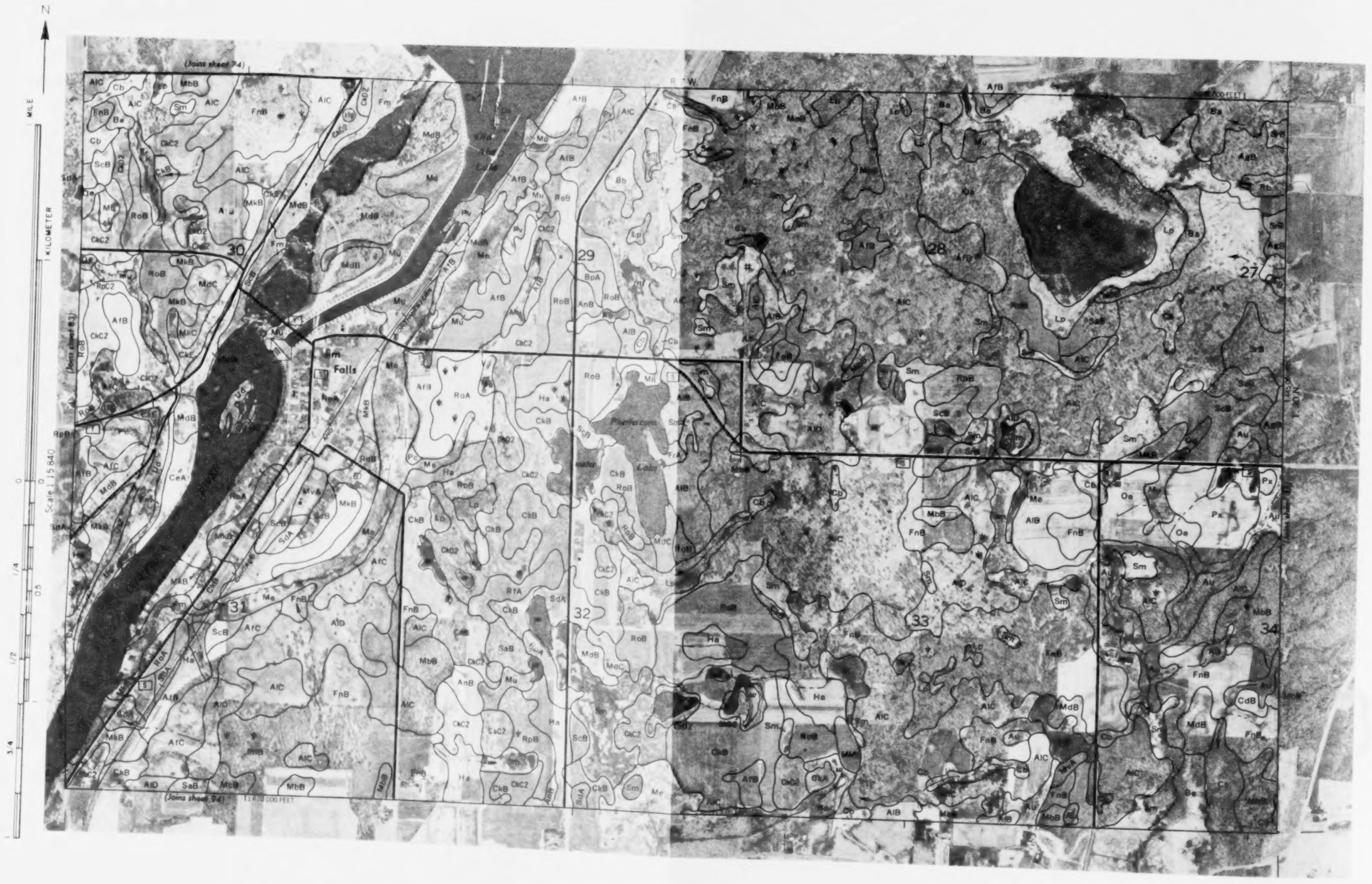
83



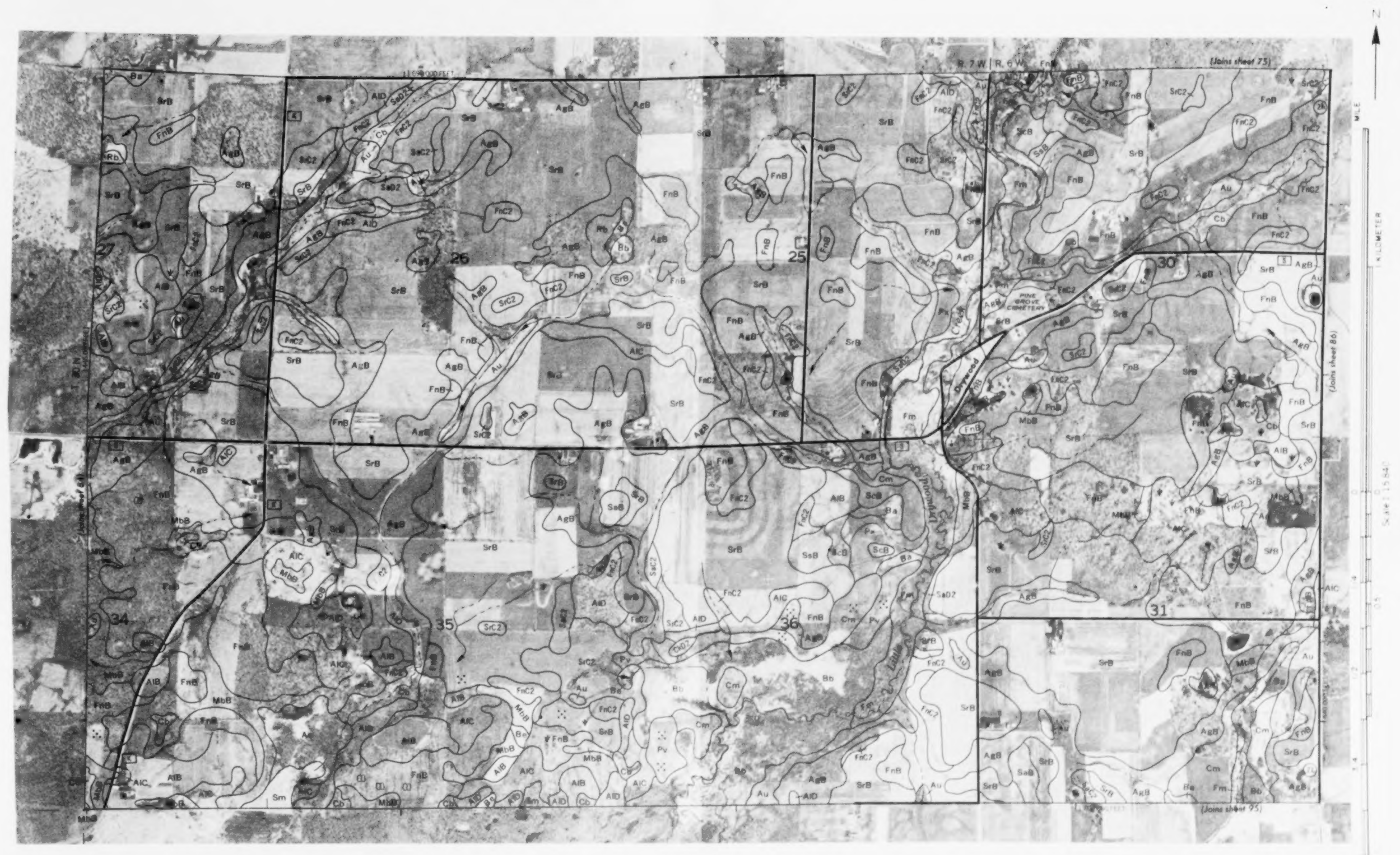
pages tightly bound

best copy available

SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 84



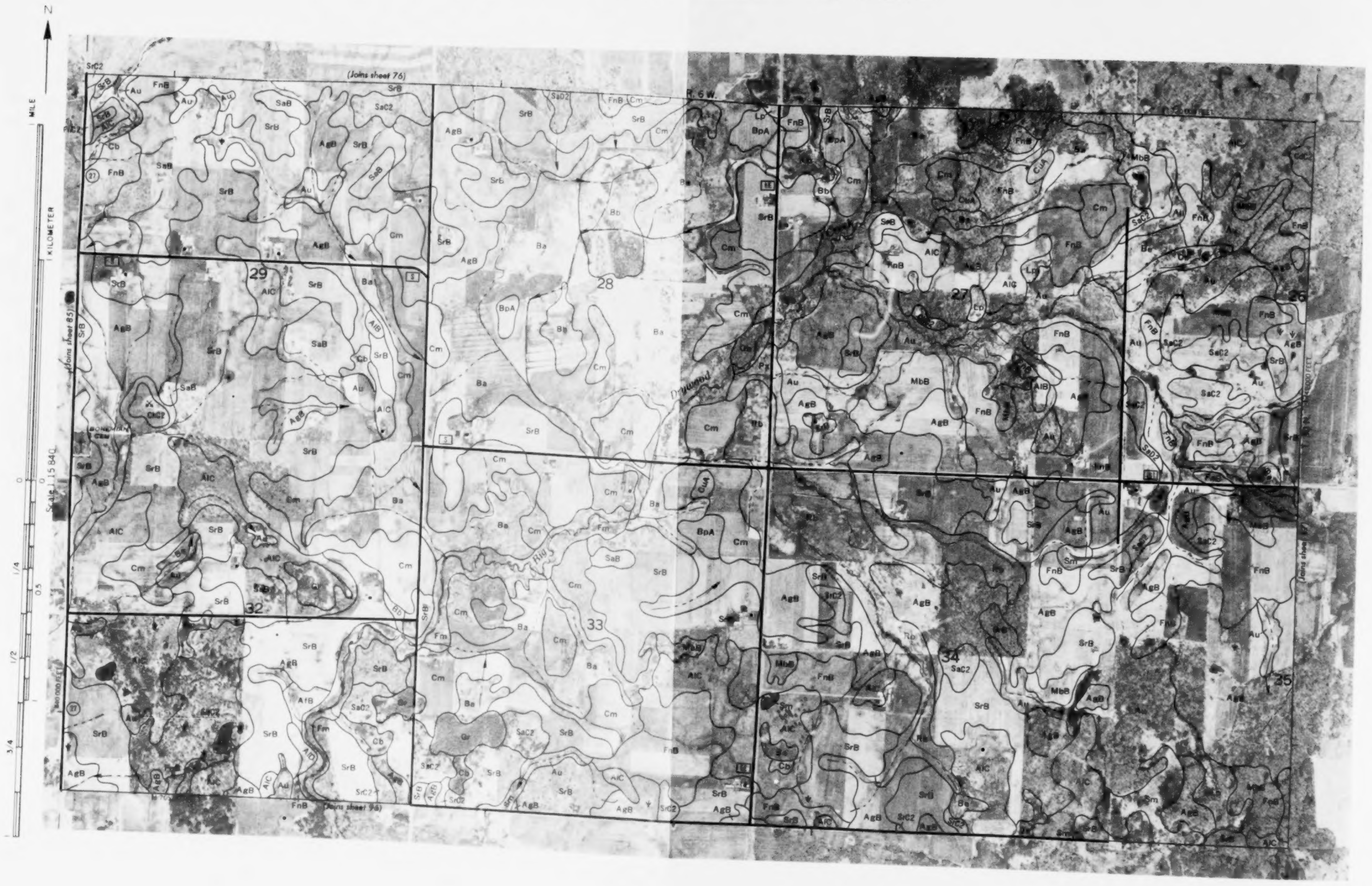
SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 85



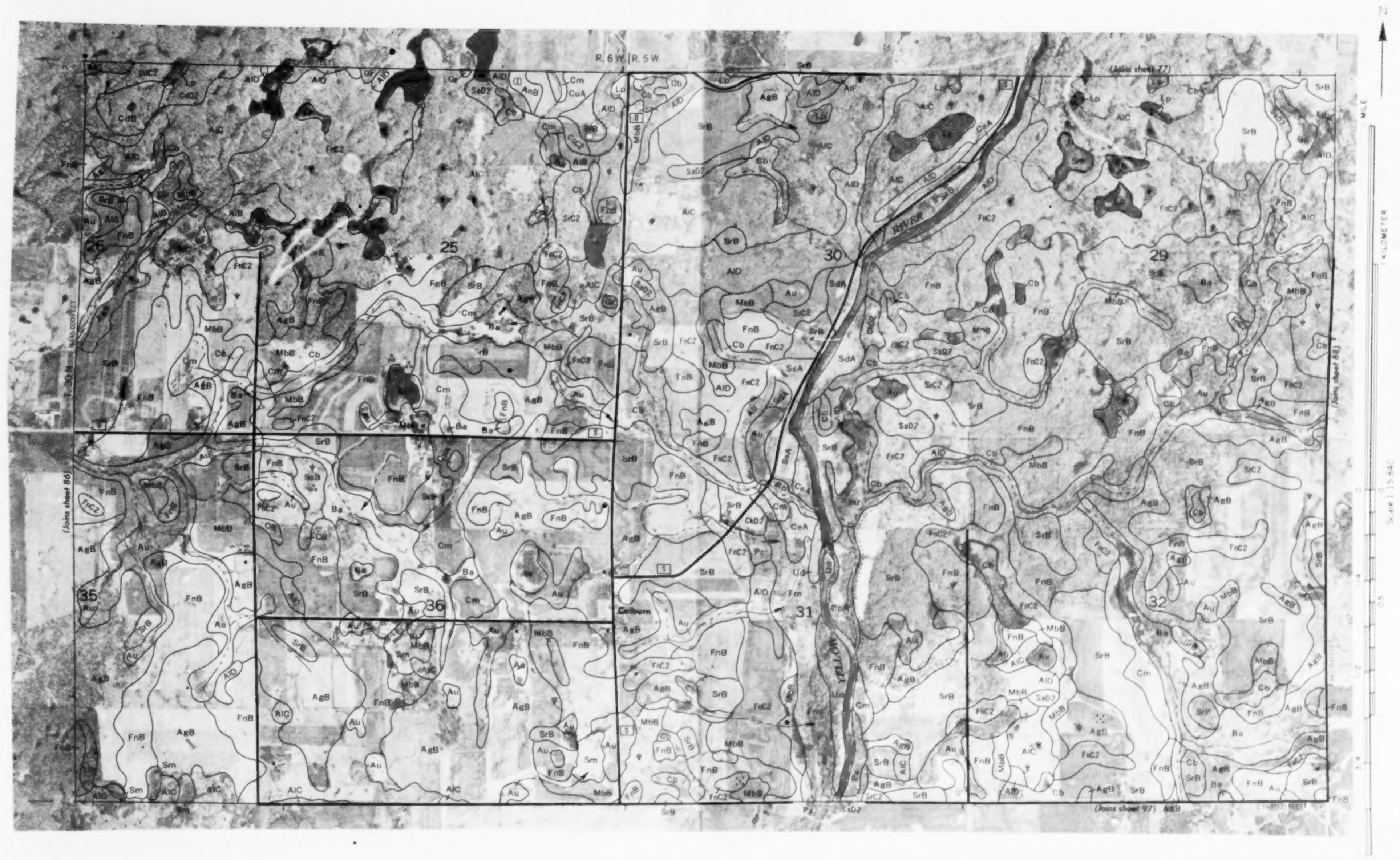
pages tightly bound

best copy available

SOIL MAP OF CHIPPEWA COUNTY WISCONSIN — SHEET NUMBER 86


N
MILE
KILOMETER
(Joins sheet 76)
R. 6 W.
28
29
32
33
34
35

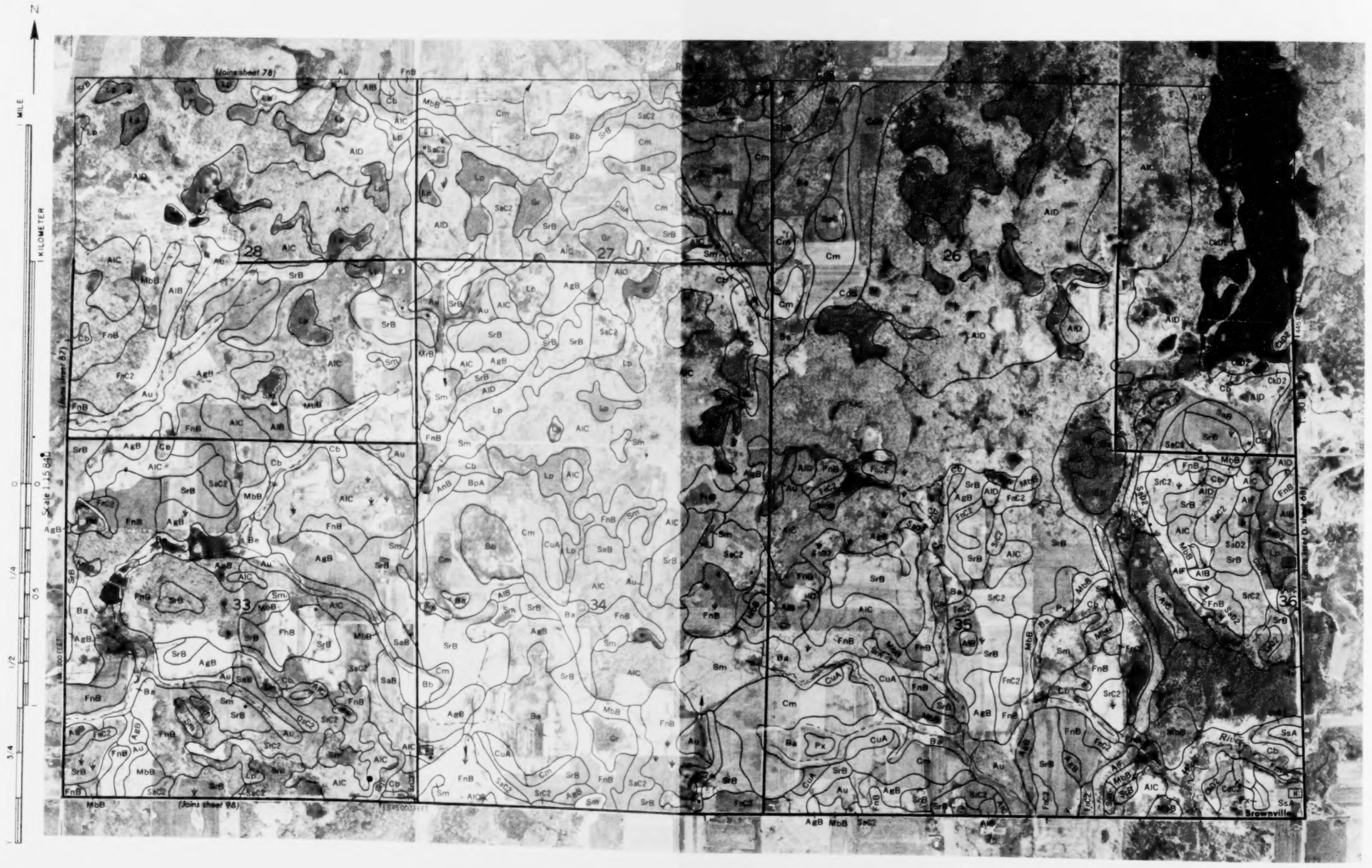
SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 87


N
MILE
KILOMETER
R. 6 W. | R. 5 W.
(Joins sheet 77)
25
29
30
31
32
35
36

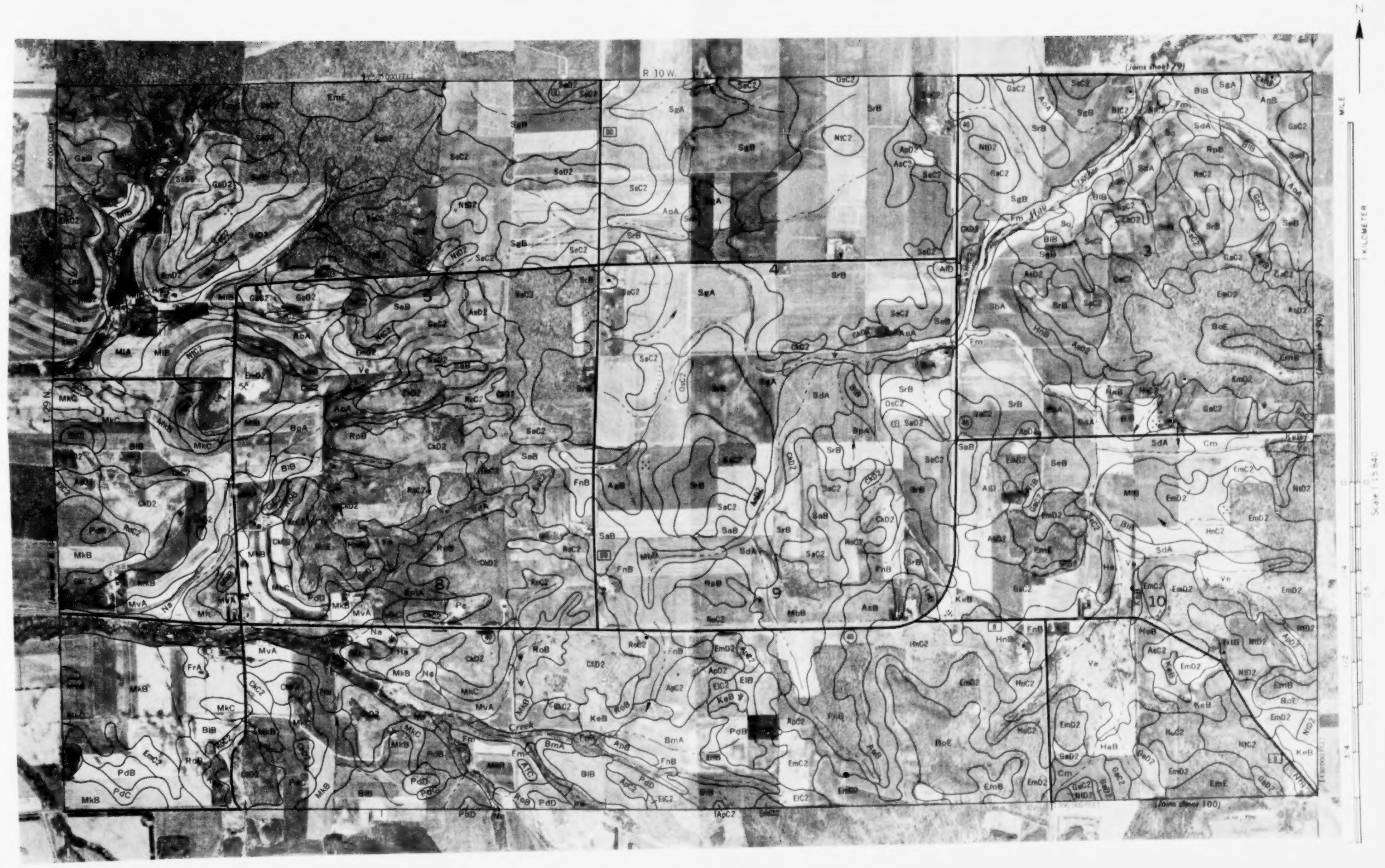
pages tightly bound

best copy available

SOIL MAP OF CHIPPEWA COUNTY WISCONSIN — SHEET NUMBER 88


N
MILE
KILOMETER
28
27
26
33
34

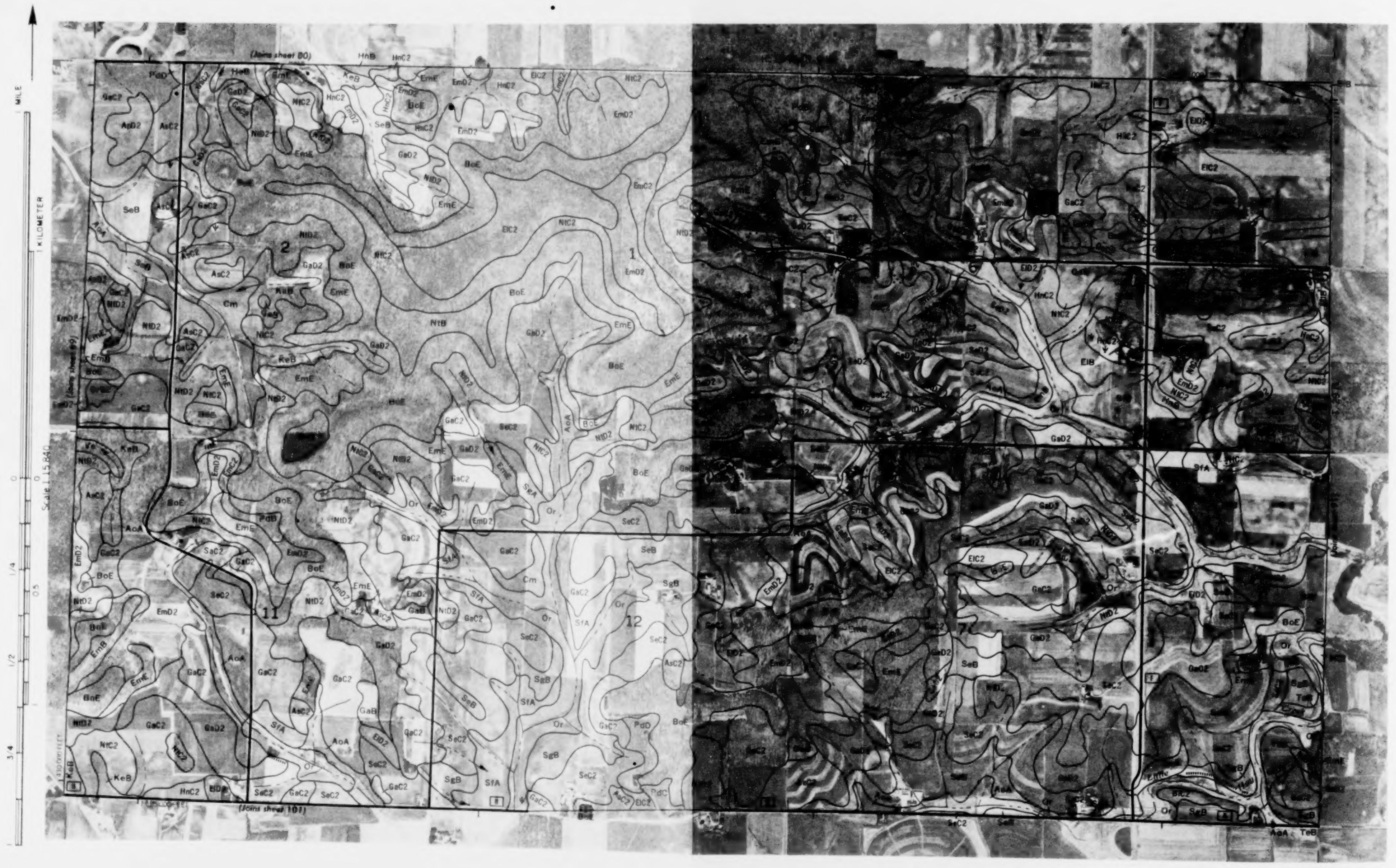
SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 89


N
MILE
KILOMETER
R. 10 W.
3
4
8
9
10

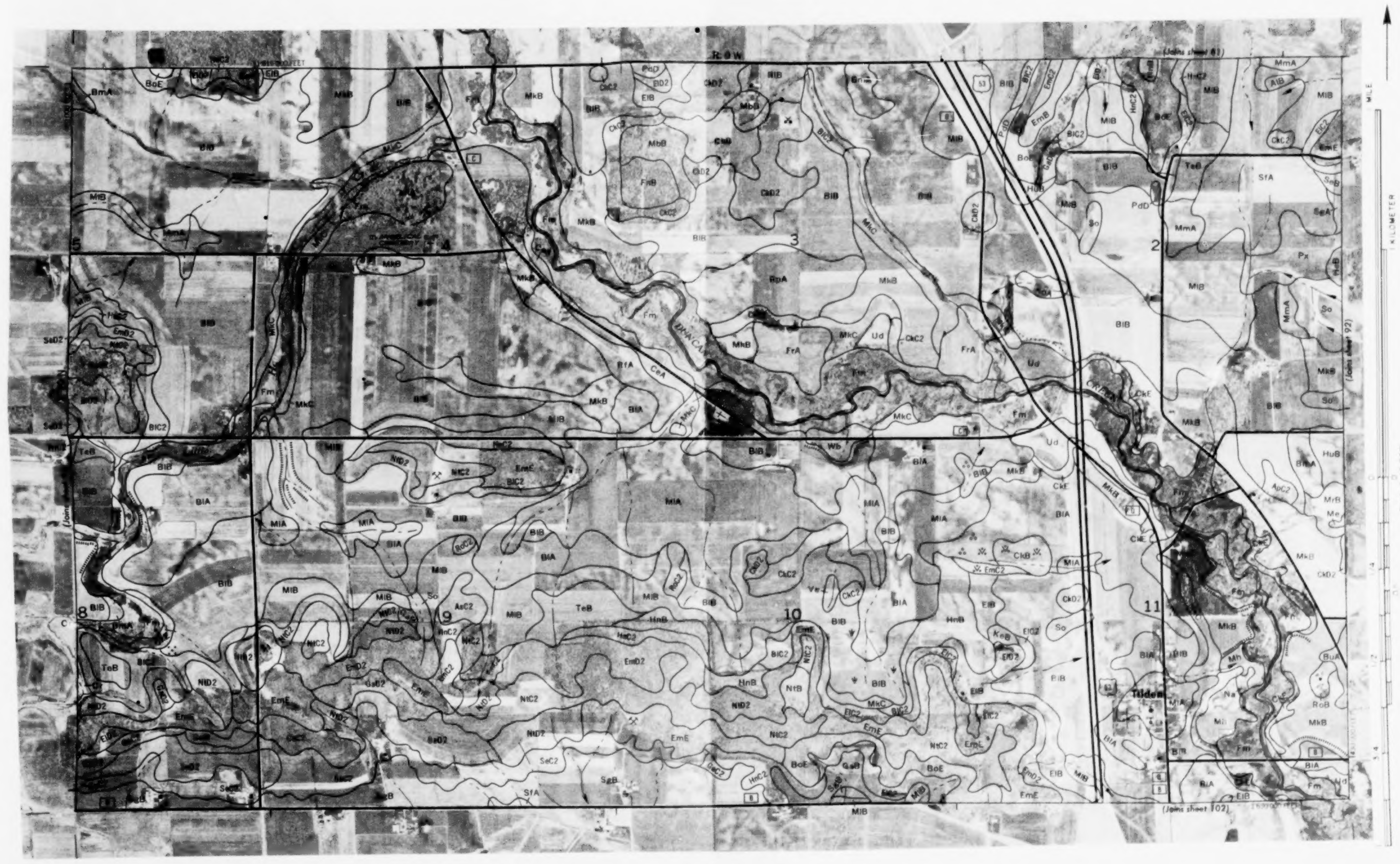
pages tightly bound

best copy available

SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 90


N
(Joins sheet 80)
(Joins sheet 101)
2
11
12

SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 91


N
(Joins sheet 81)
(Joins sheet 102)
3
2
8
9
10
11

pages tightly bound

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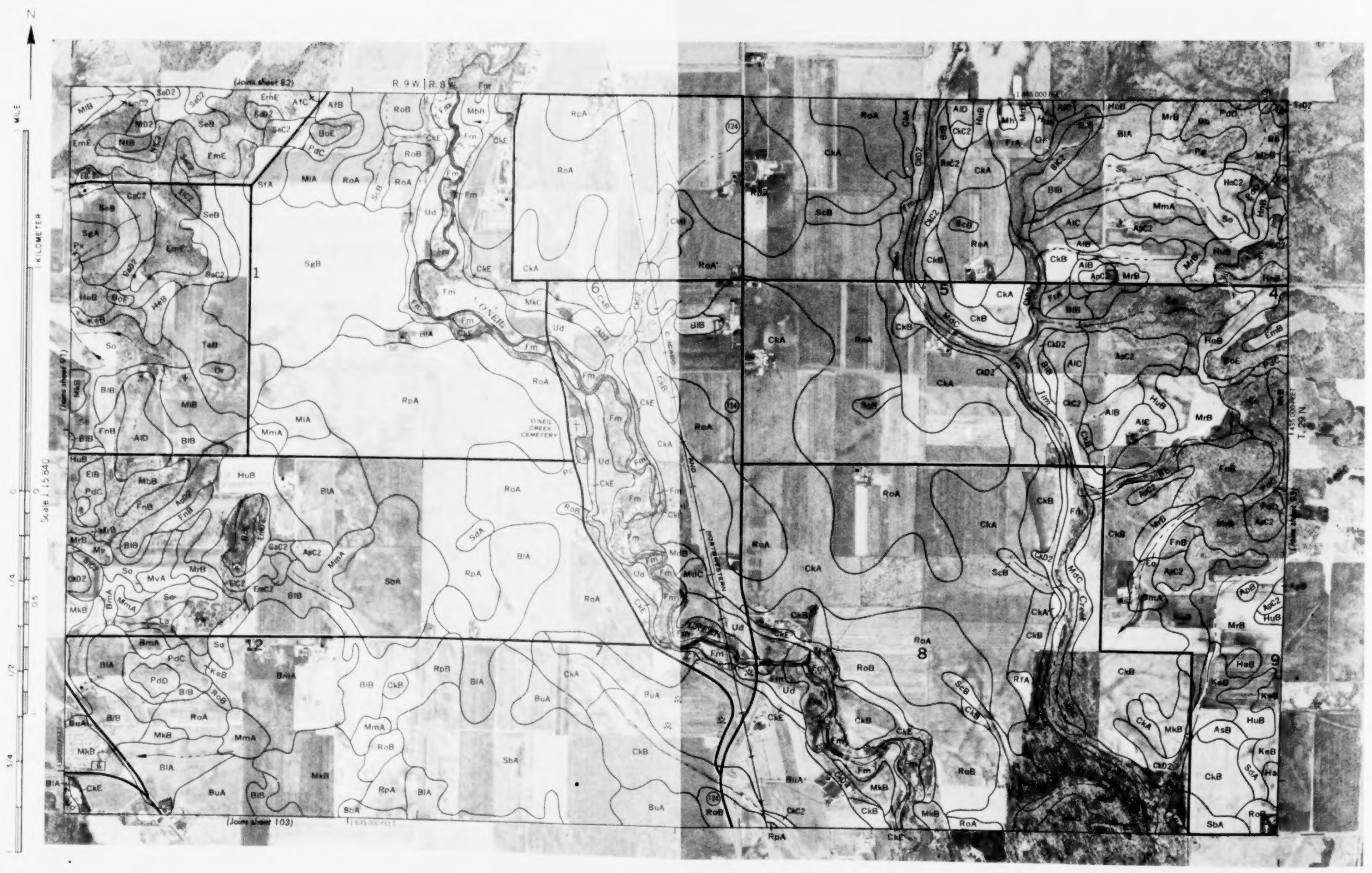
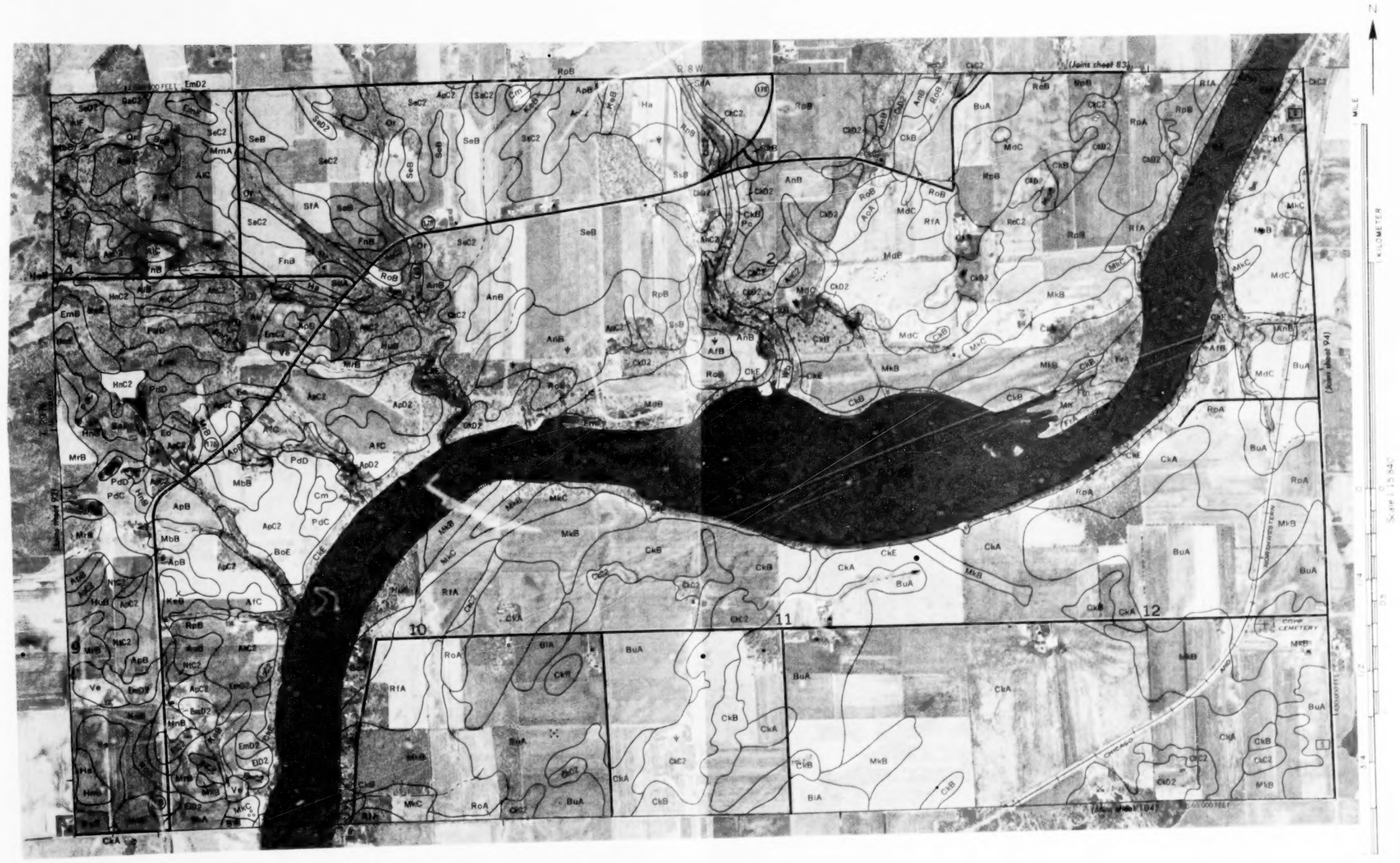
SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 92



SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 93



pages tightly bound

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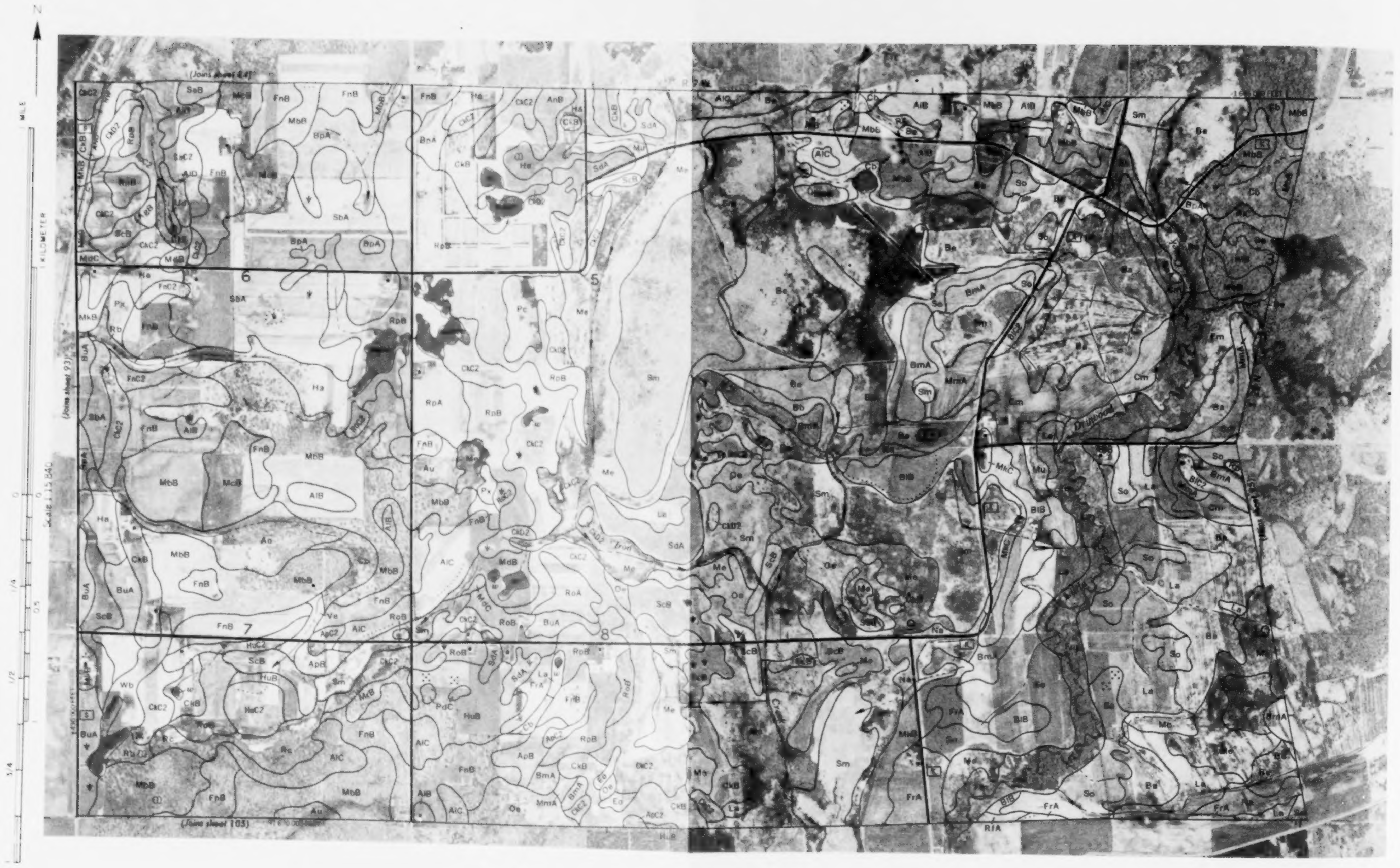
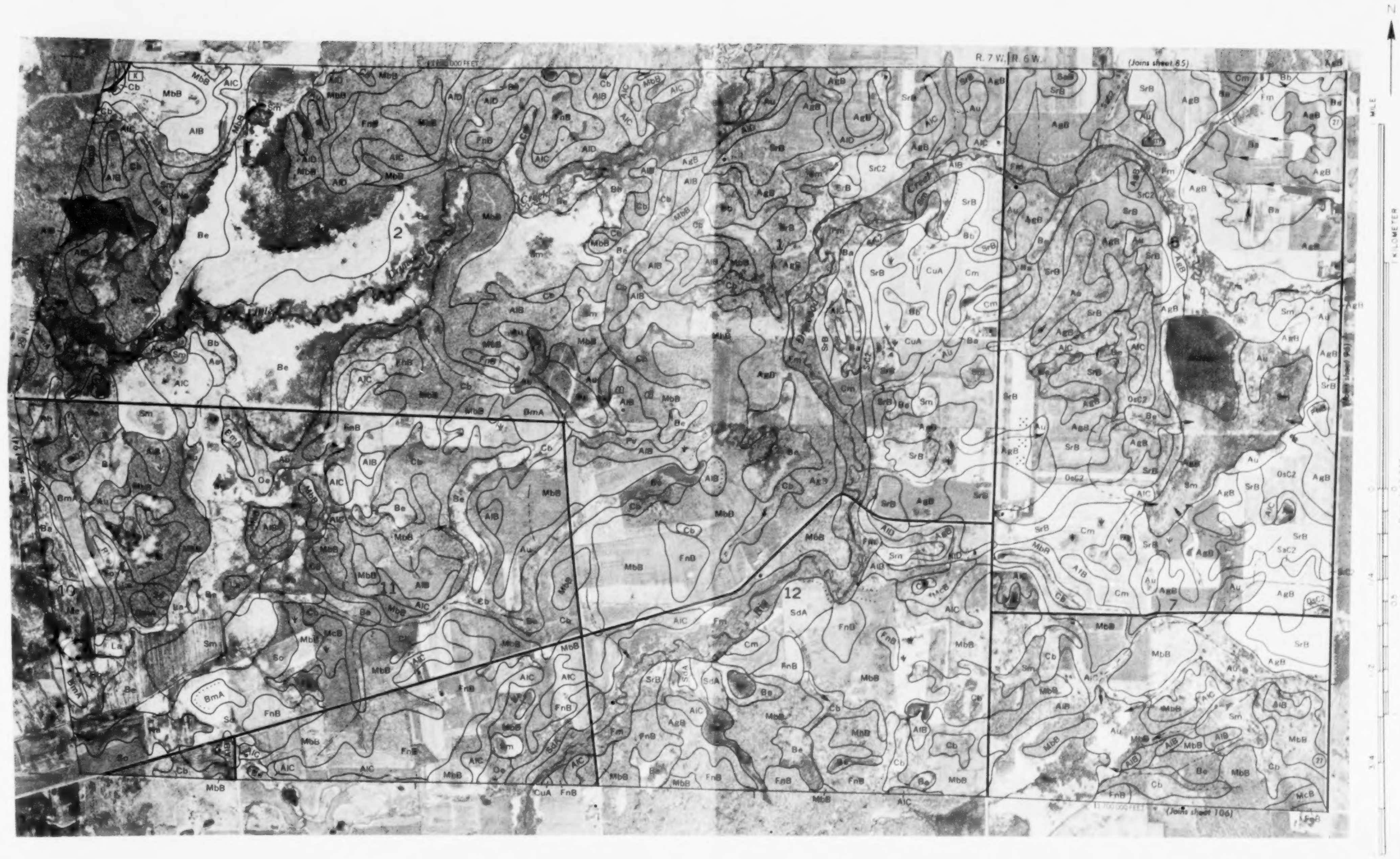
SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 94


N
(Joins sheet 84)
(Joins sheet 103)
6
5
7
8

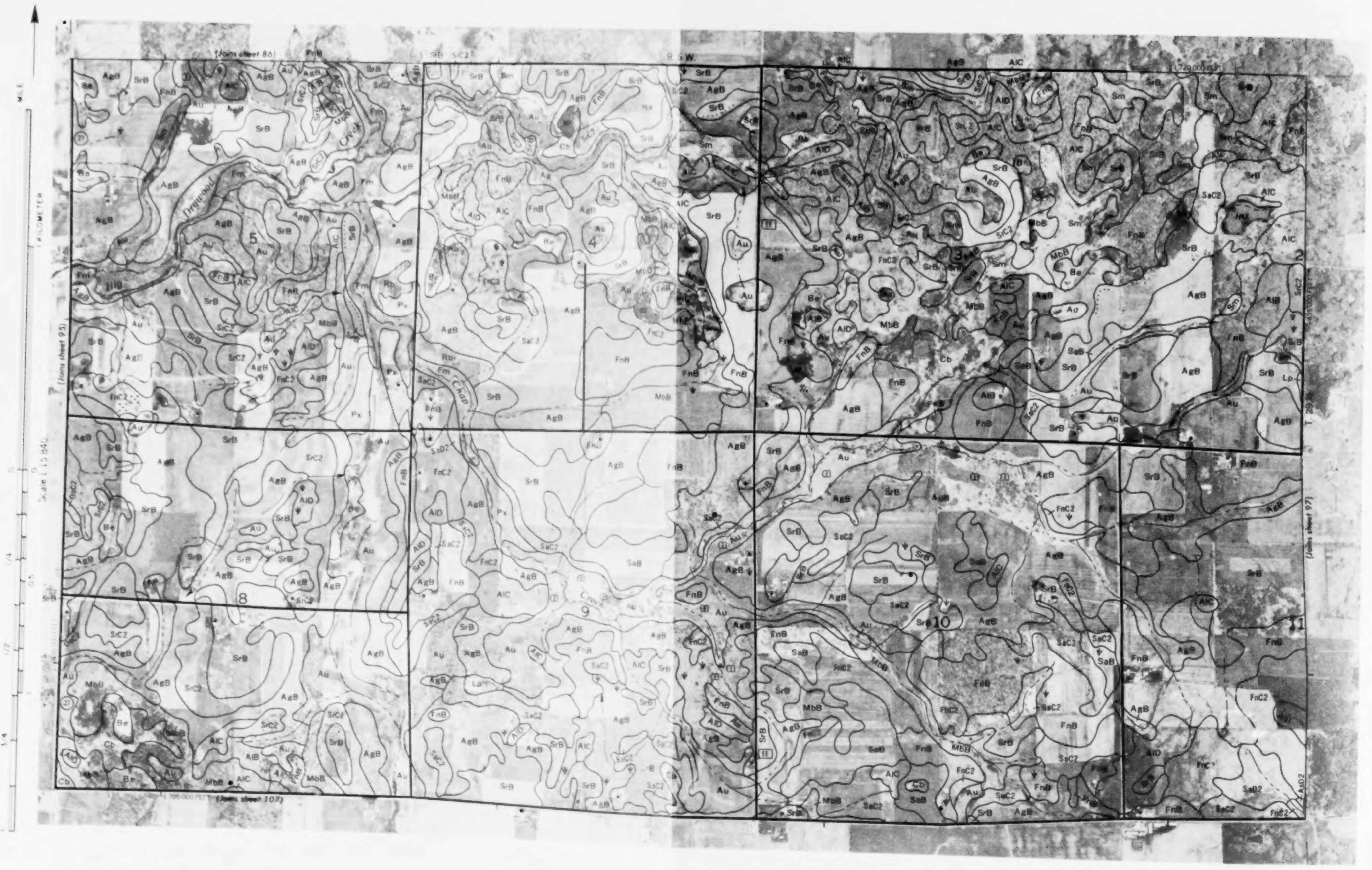
SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 95


N
(Joins sheet 85)
(Joins sheet 104)
2
12
7

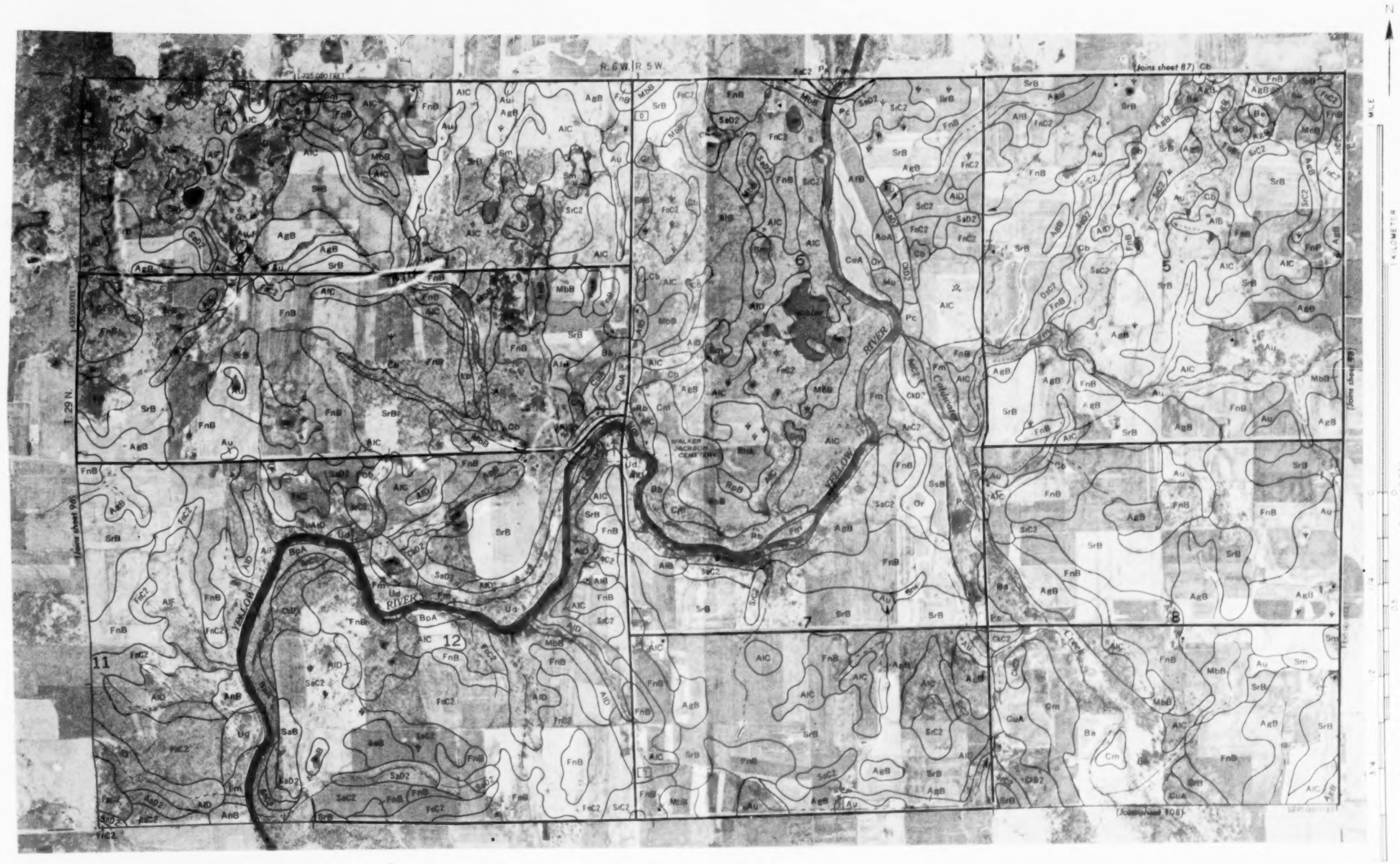
pages tightly bound

best copy available

SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 96


N
(Joins sheet 86)
R. 6 W.
(Joins sheet 97)
(Joins sheet 107)

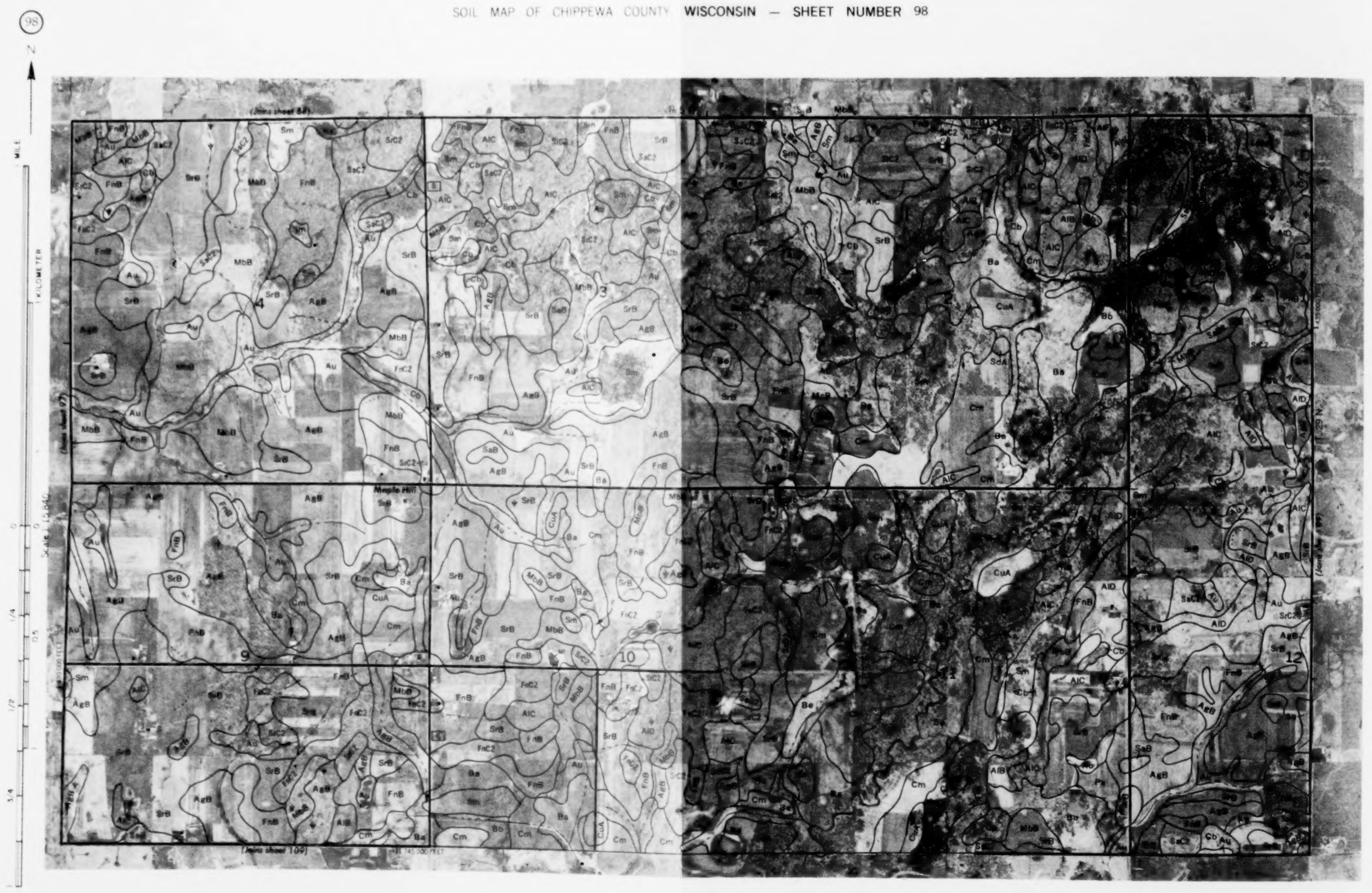
SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 97


N
R. 6 W. | R. 5 W.
(Joins sheet 87)

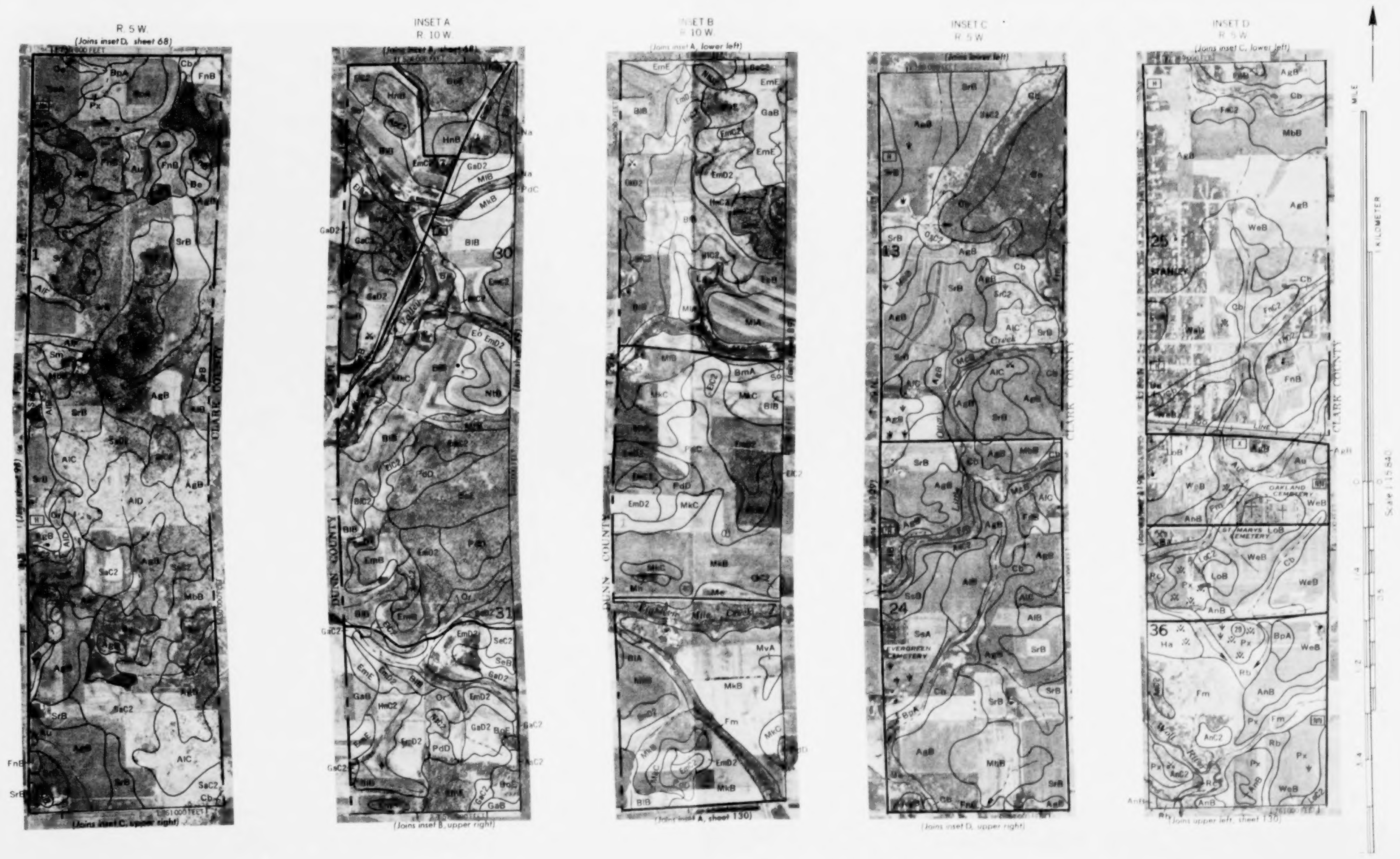
pages tightly bound

best copy available

SOIL MAP OF CHIPPEWA COUNTY WISCONSIN — SHEET NUMBER 98


N
MILE
KILOMETER
Maple Hill
10

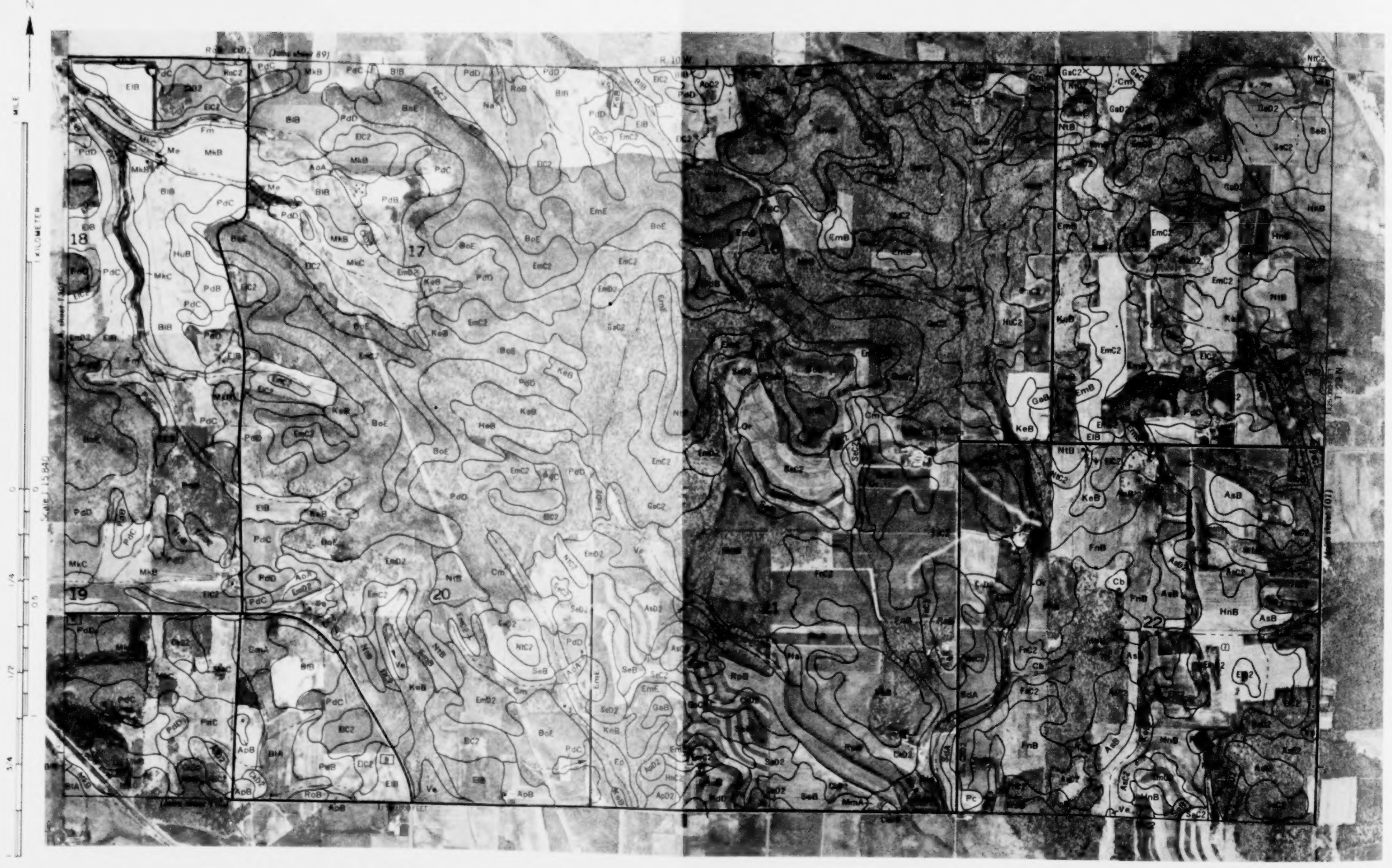
SOIL MAP OF CHIPPEWA COUNTY WISCONSIN — SHEET NUMBER 99


R. 5 W.
(Joins inset D, sheet 68)
INSET A
R. 10 W.
INSET B
R. 10 W.
(Joins inset A, lower left)
INSET C
R. 5 W.
INSET D
R. 5 W.
(Joins inset C, lower left)
N
MILE
KILOMETER

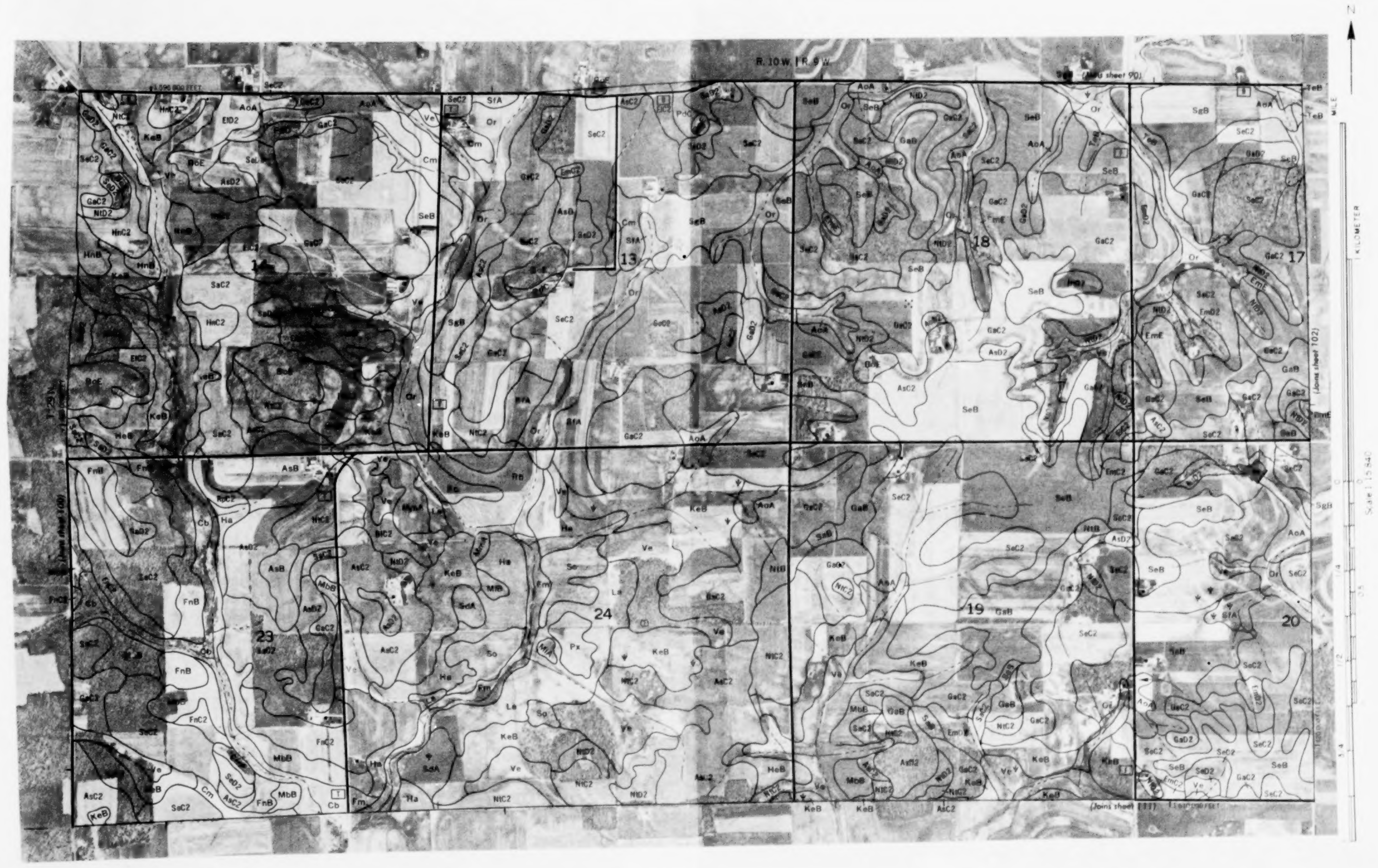
pages tightly bound

best copy available

SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 100


N
(Joins sheet 89)
R. 10 W.
MILE
18
17
19
20

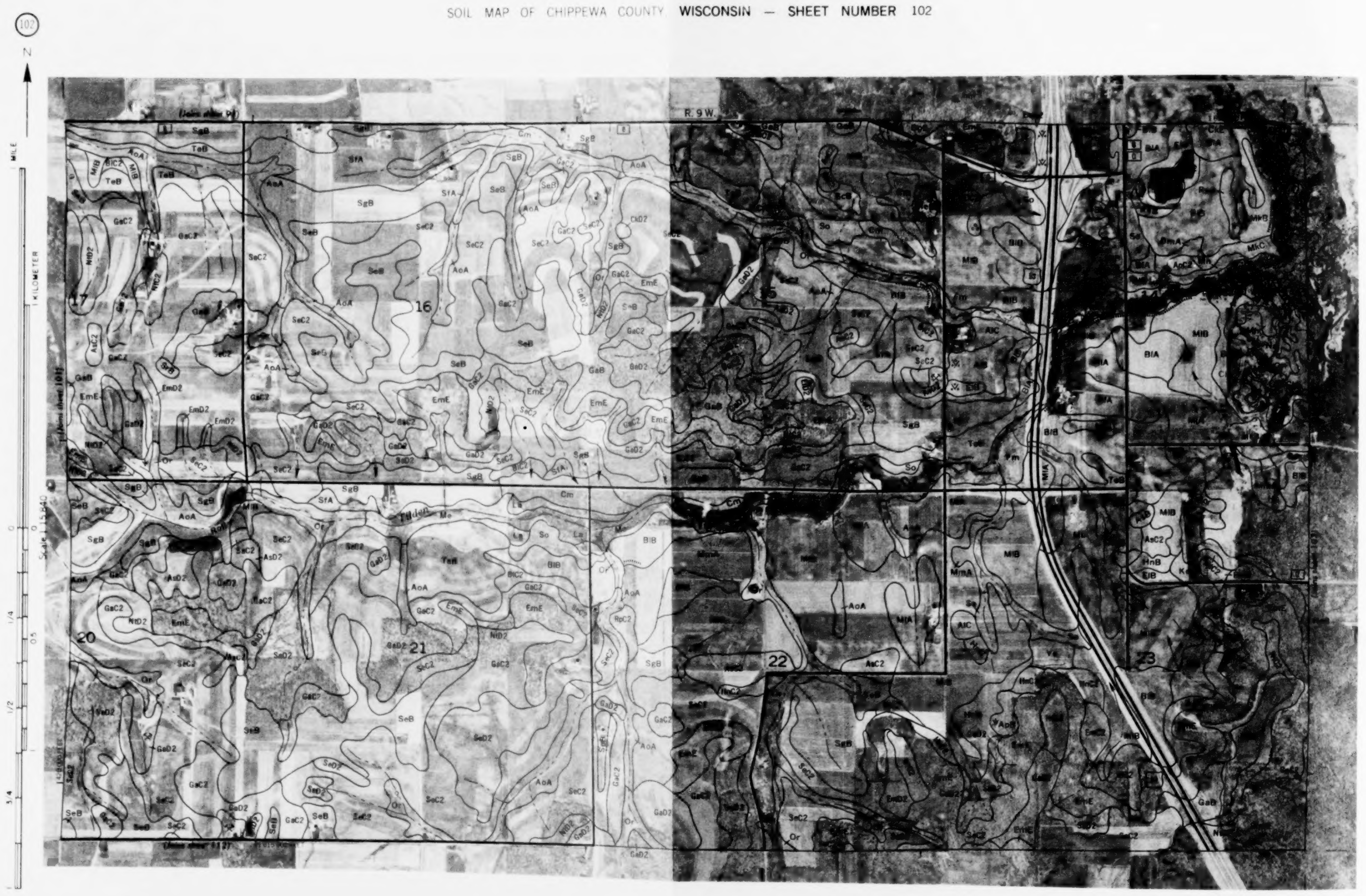
SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 101


N
R. 10 W. | R. 9 W.
(Joins sheet 90)
MILE
13
18
17
23
24
19
20

pages tightly bound

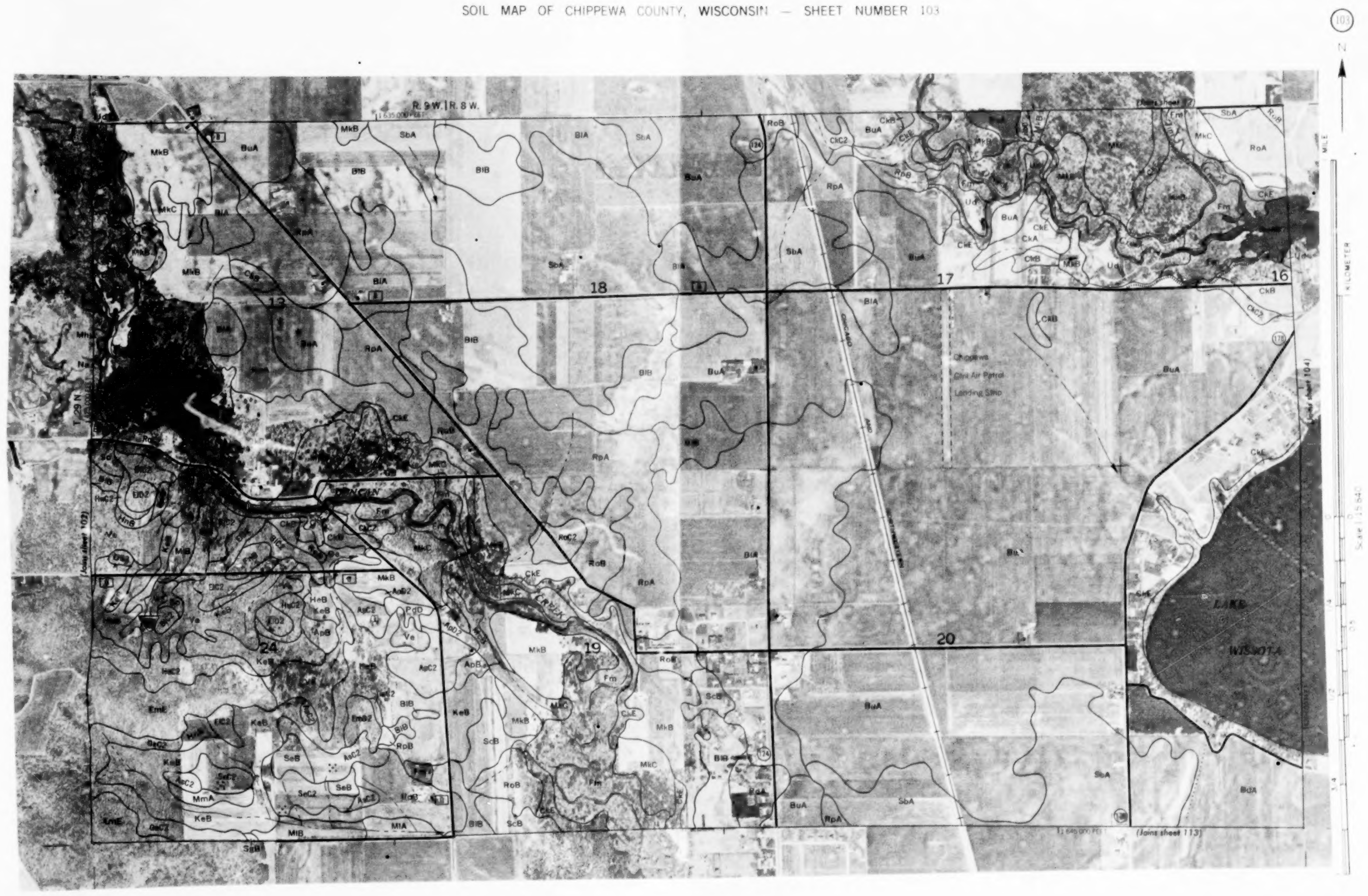
best copy available

SOIL MAP OF CHIPPEWA COUNTY WISCONSIN — SHEET NUMBER 102



N
R. 9 W.
16
21
22
23

SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 103

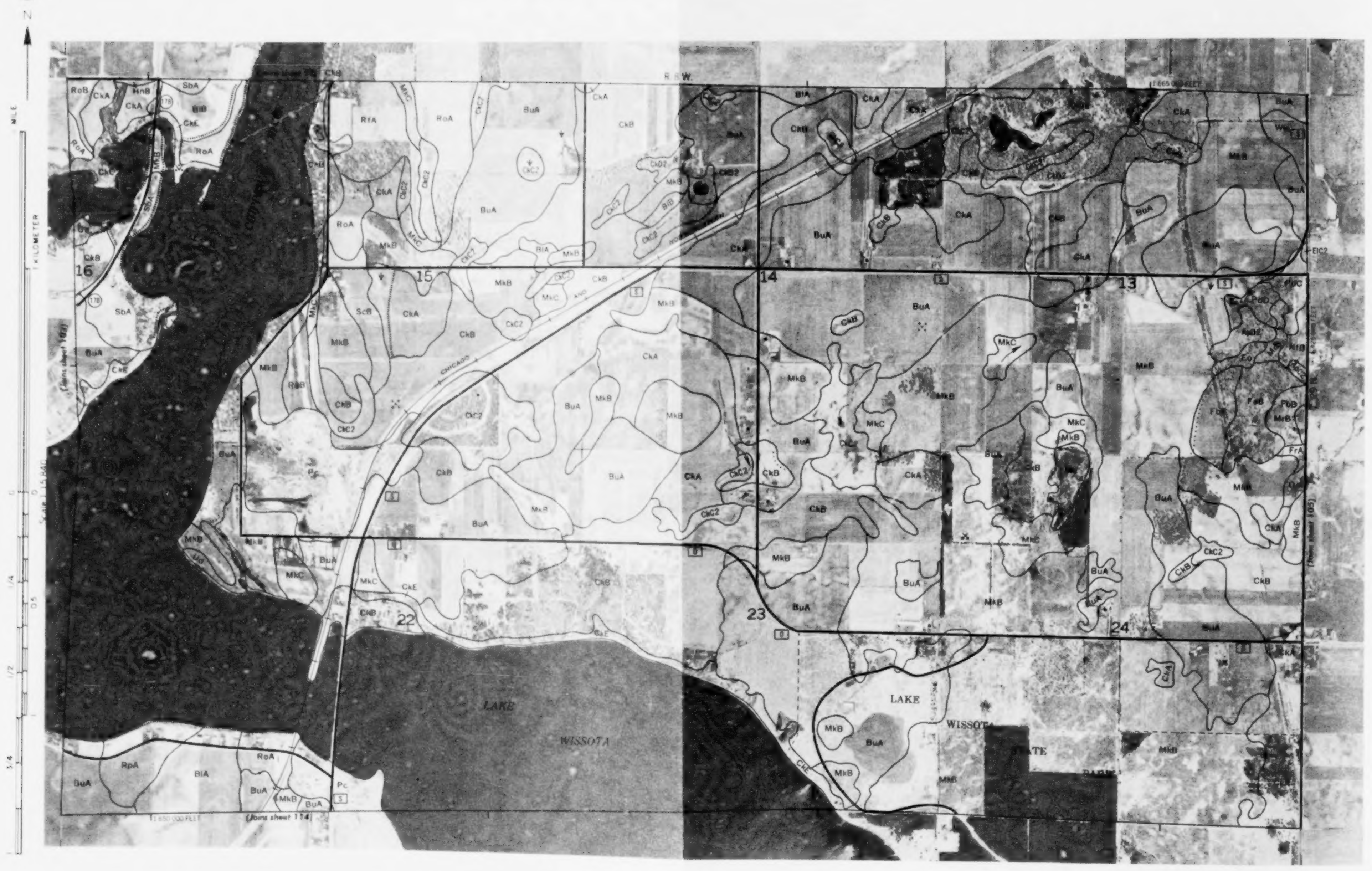


N
R. 9 W. | R. 8 W.
18
17
16
19
20

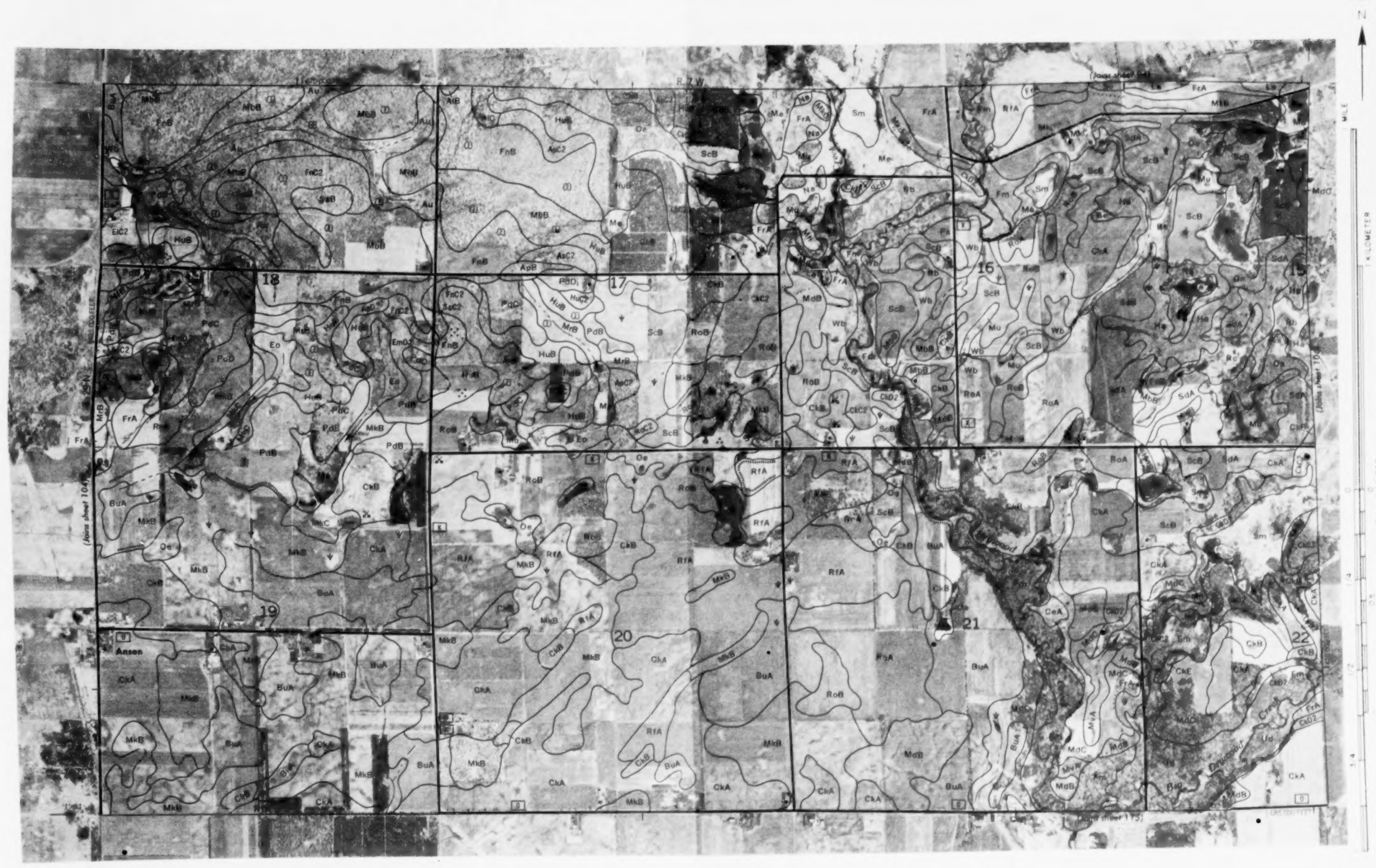
pages tightly bound

best copy available

SOIL MAP OF CHIPPEWA COUNTY WISCONSIN — SHEET NUMBER 104


N
R 8 W.
LAKE
WISSOTA
16
15
14
13
22
23
24

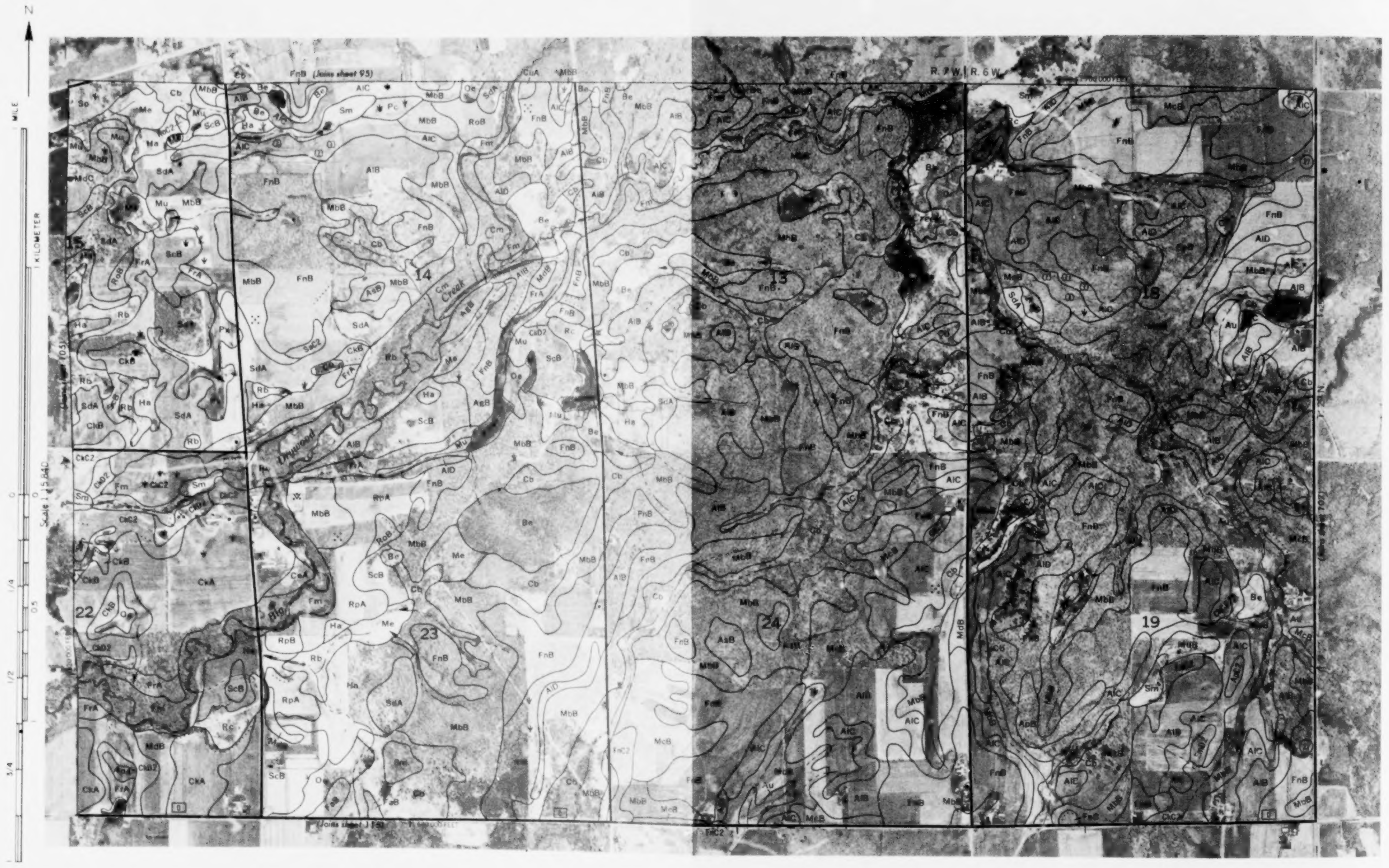
SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 105


N
R 7 W.
18
17
16
19
20
21
22

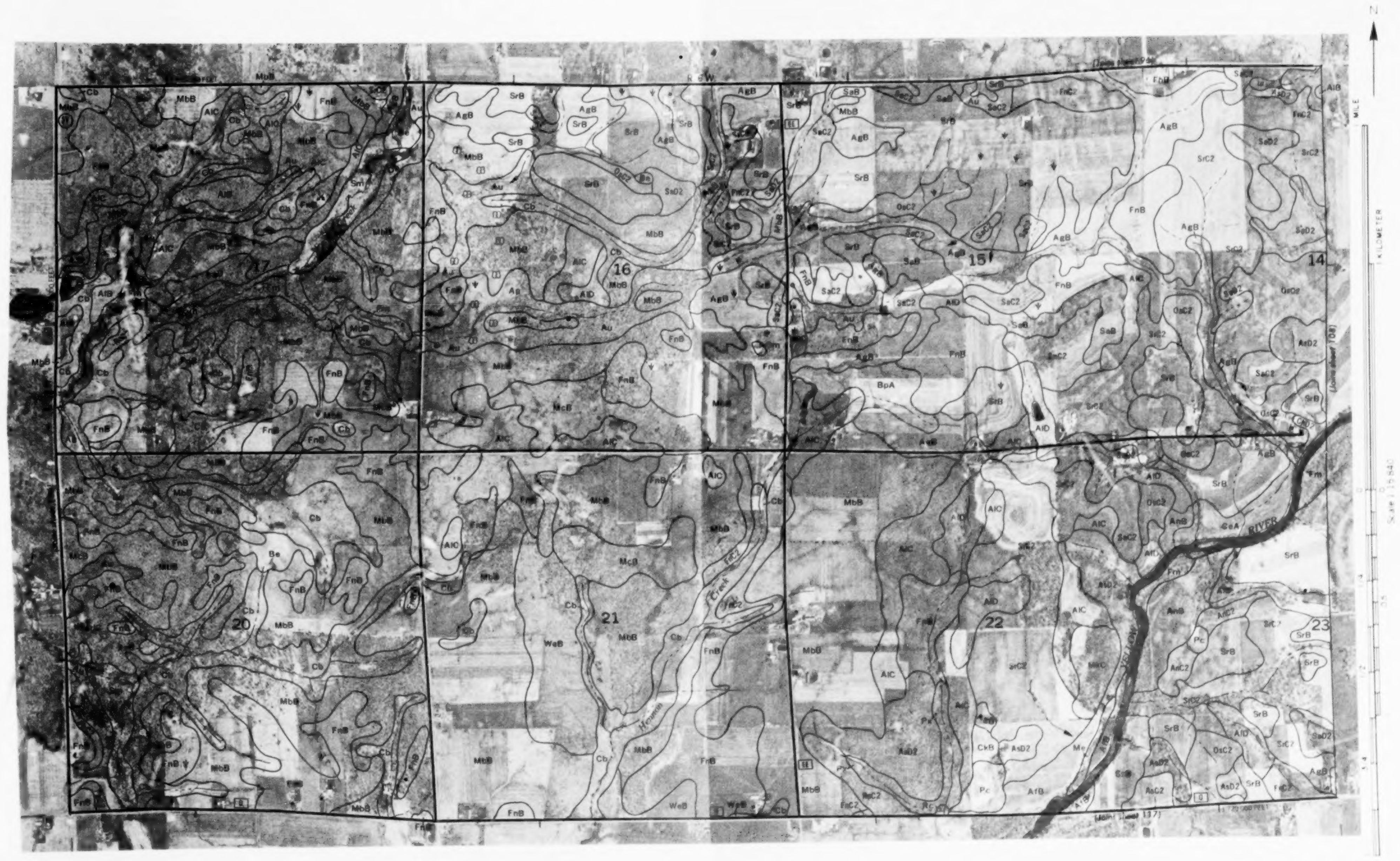
pages tightly bound

best copy available

SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 106


N
(Joins sheet 95)
R. 8 W. | R. 6 W.
14
22
23
24
19

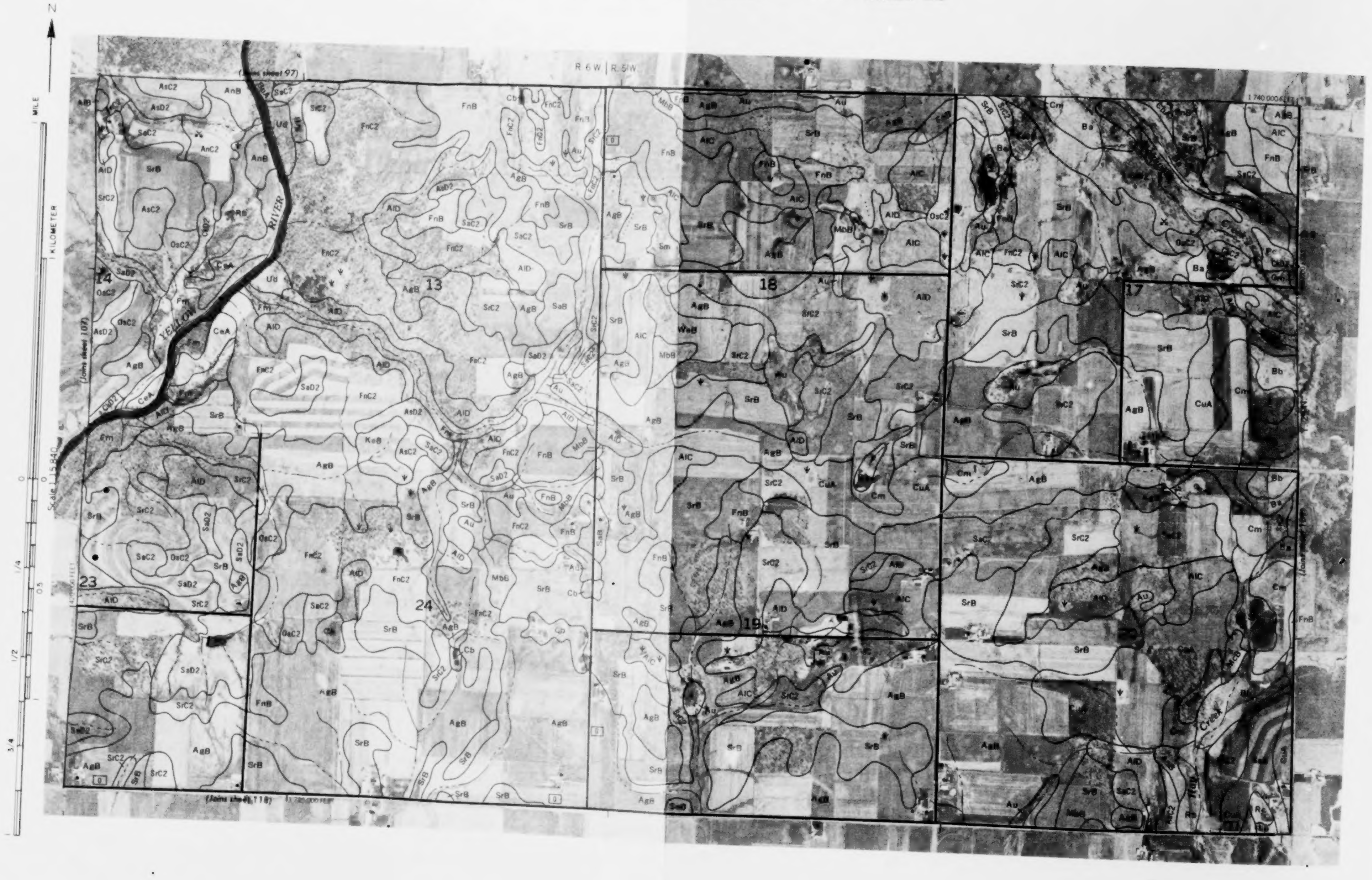
SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 107


N
16
15
14
20
21
22
23

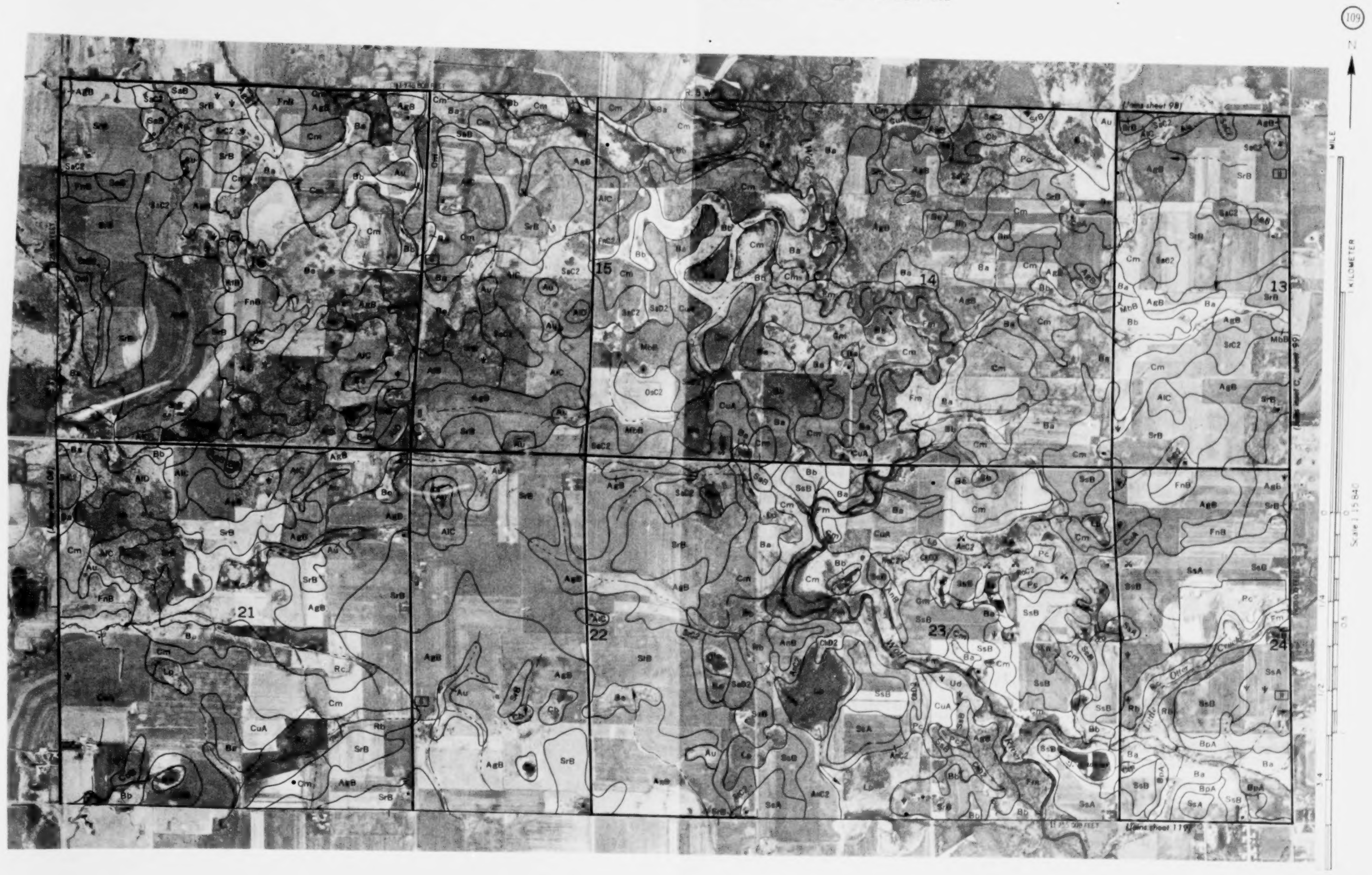
pages tightly bound

best copy available

SOIL MAP OF CHIPPEWA COUNTY WISCONSIN — SHEET NUMBER 108


N
13
18
17
23
24
19

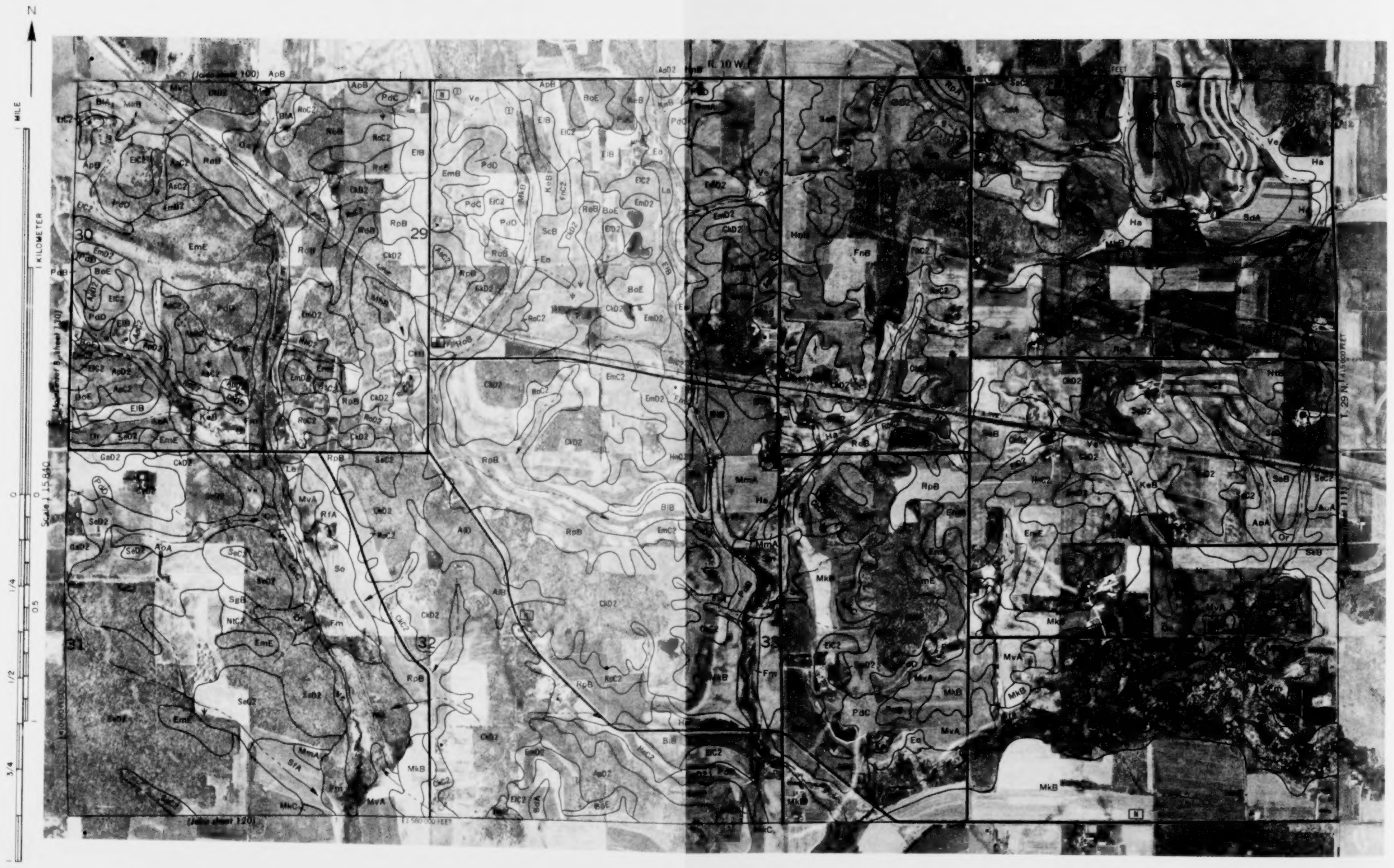
SOIL MAP OF CHIPPEWA COUNTY WISCONSIN — SHEET NUMBER 109


N
15
14
13
21
22
23
24

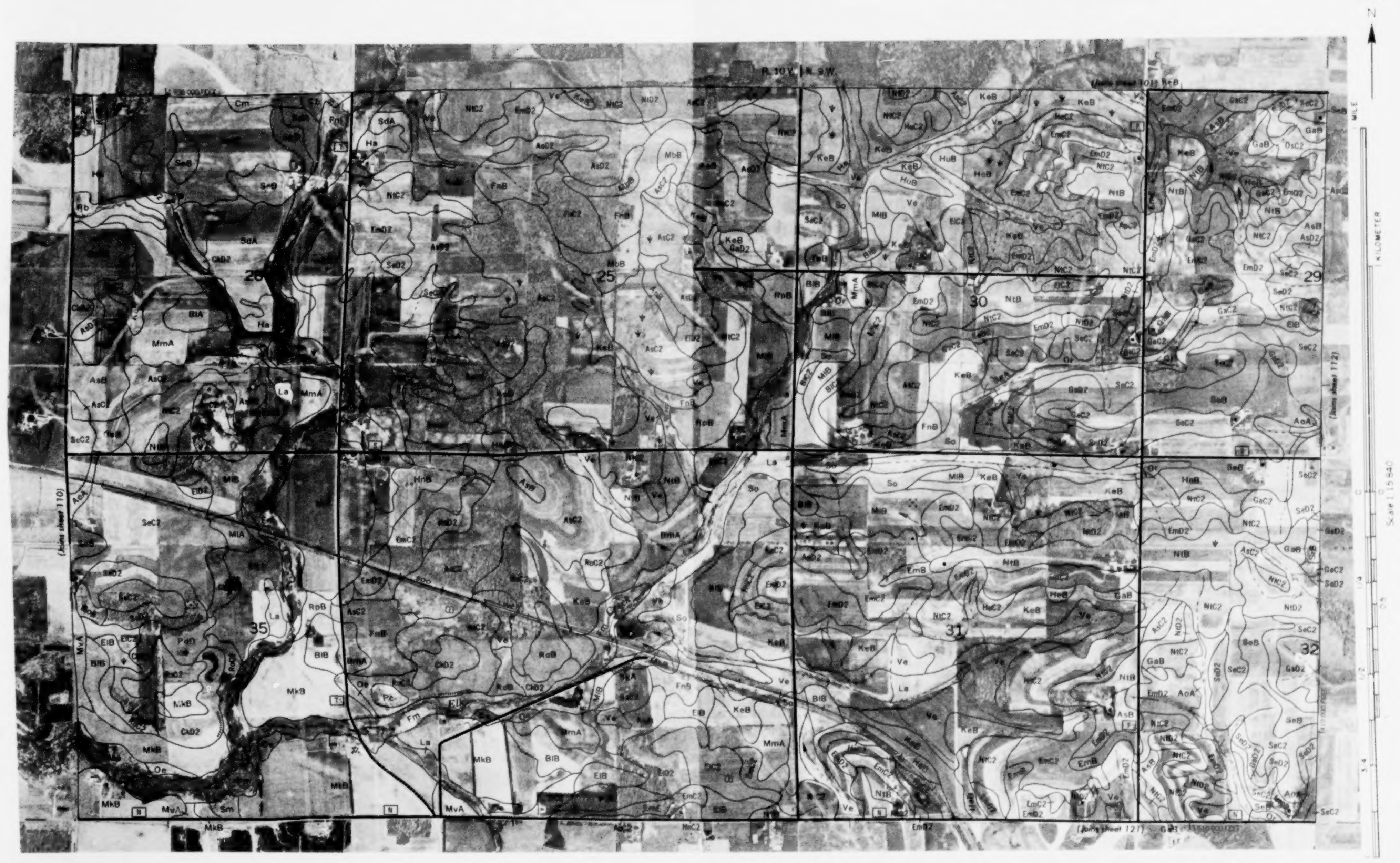
pages tightly bound

best copy available

SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 110


N
MILE
KILOMETER
R. 10 W.
29
30
32

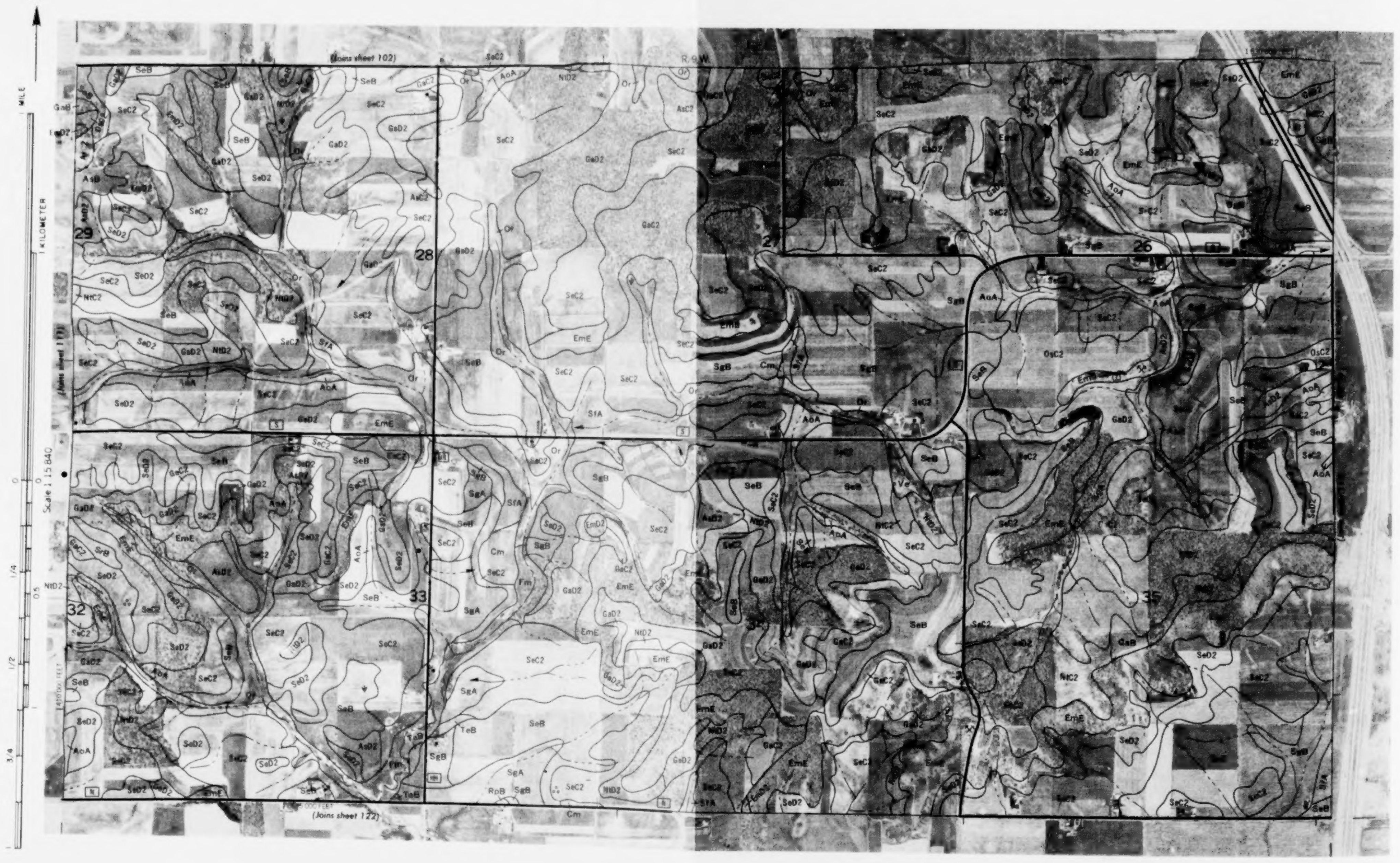
SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 111


N
R. 10 W. | R. 9 W.
MILE
KILOMETER
25
29
30
32
35

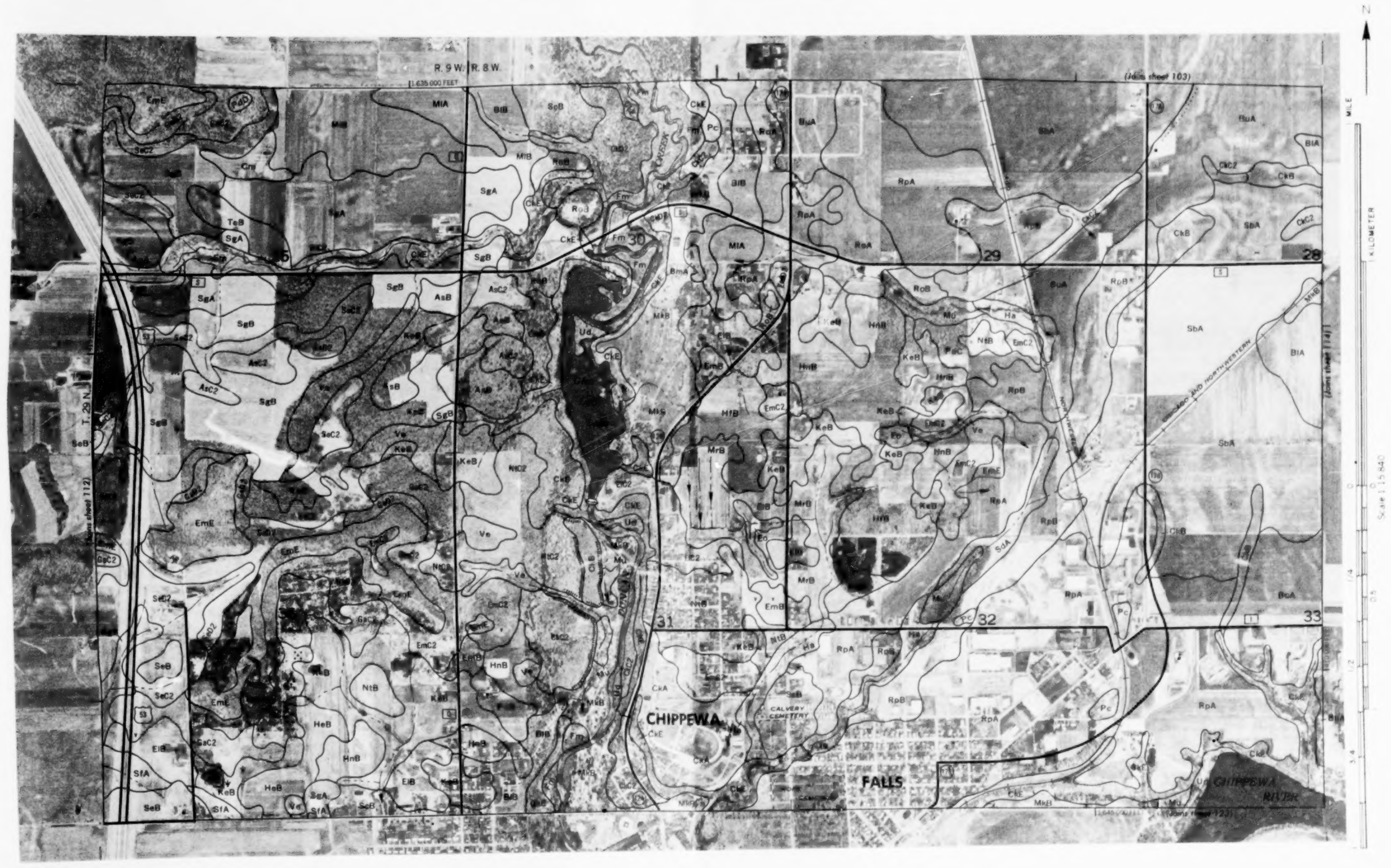
pages tightly bound

best copy available

SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 112


N
(Joins sheet 102)
R. 9 W.
(Joins sheet 122)
(Joins sheet 111)
(Joins sheet 113)
29
28
32
33
26
35
1 MILE
1 KILOMETER
Scale 1:15 840

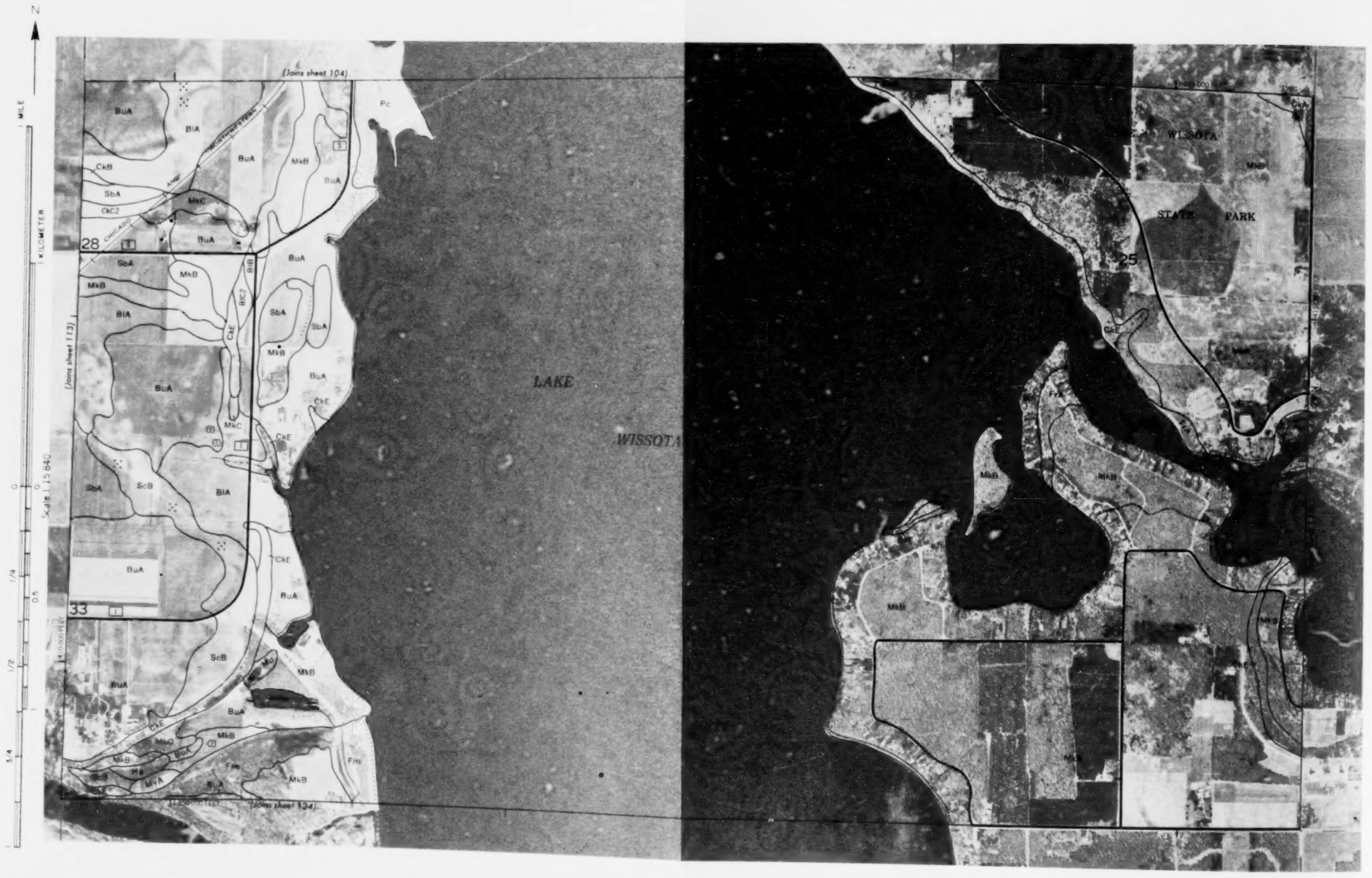
SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 113


N
R. 9 W. R. 8 W.
1 635 000 FEET
(Joins sheet 103)
29
28
30
32
33
CHIPPEWA
FALLS
1 MILE
1 KILOMETER
Scale 1:15 840

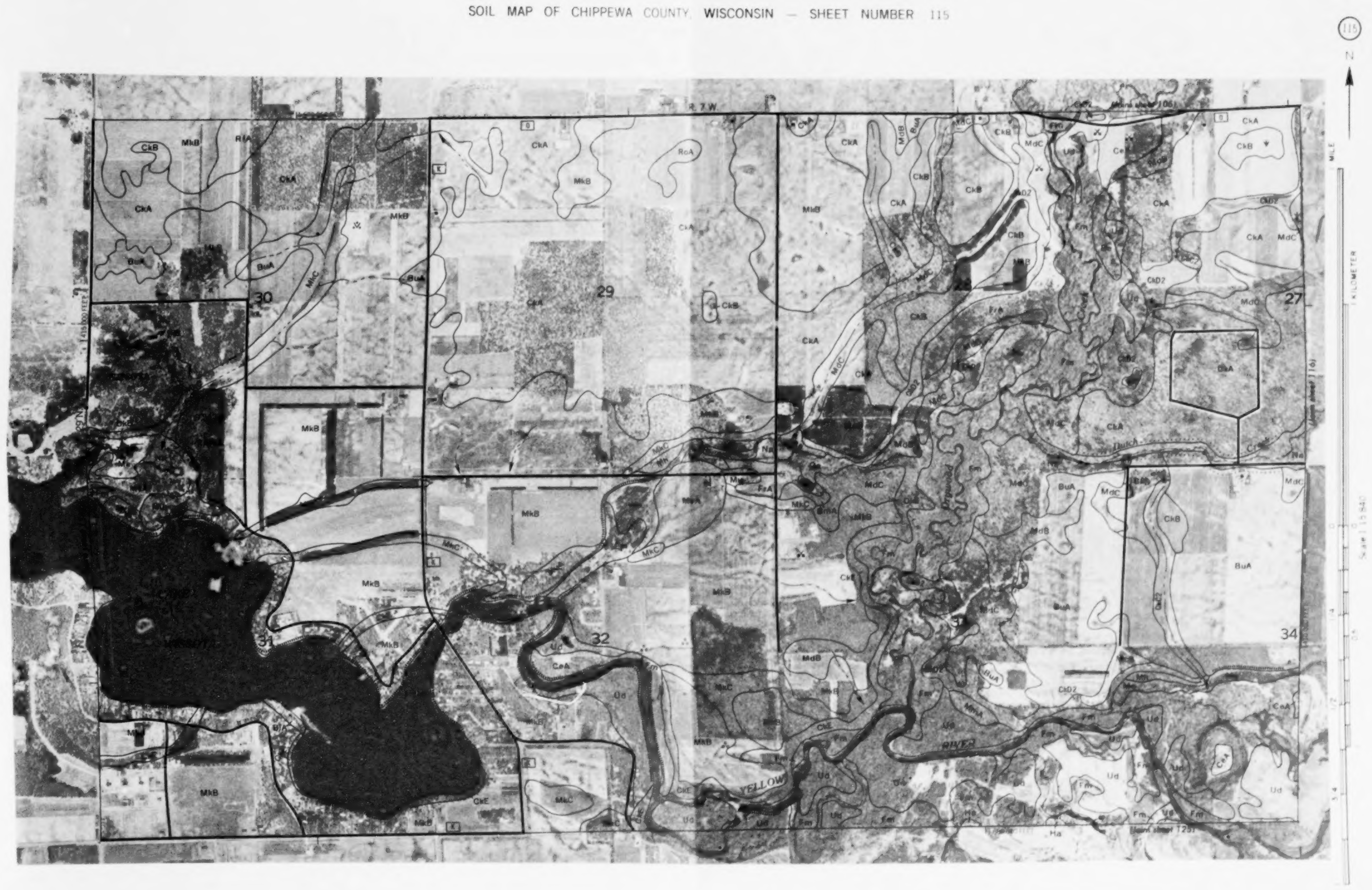
pages tightly bound

best copy available

SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 114


114
N
LAKE
WISSOTA
STATE PARK
28
33
25
(Joins sheet 104)
(Joins sheet 113)
(Joins sheet 124)

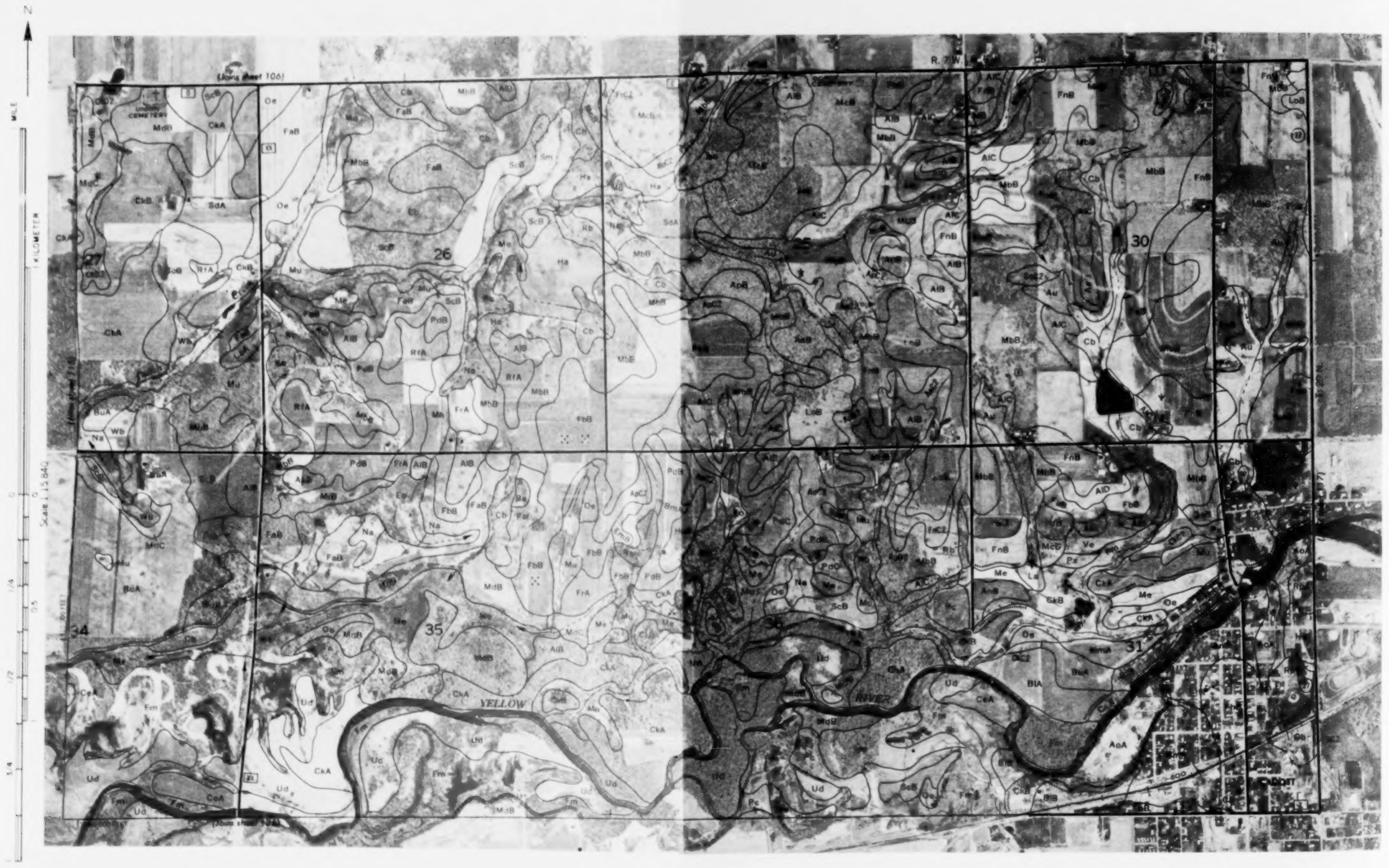
SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 115


115
N
30
29
27
32
34
(Joins sheet 105)
(Joins sheet 116)

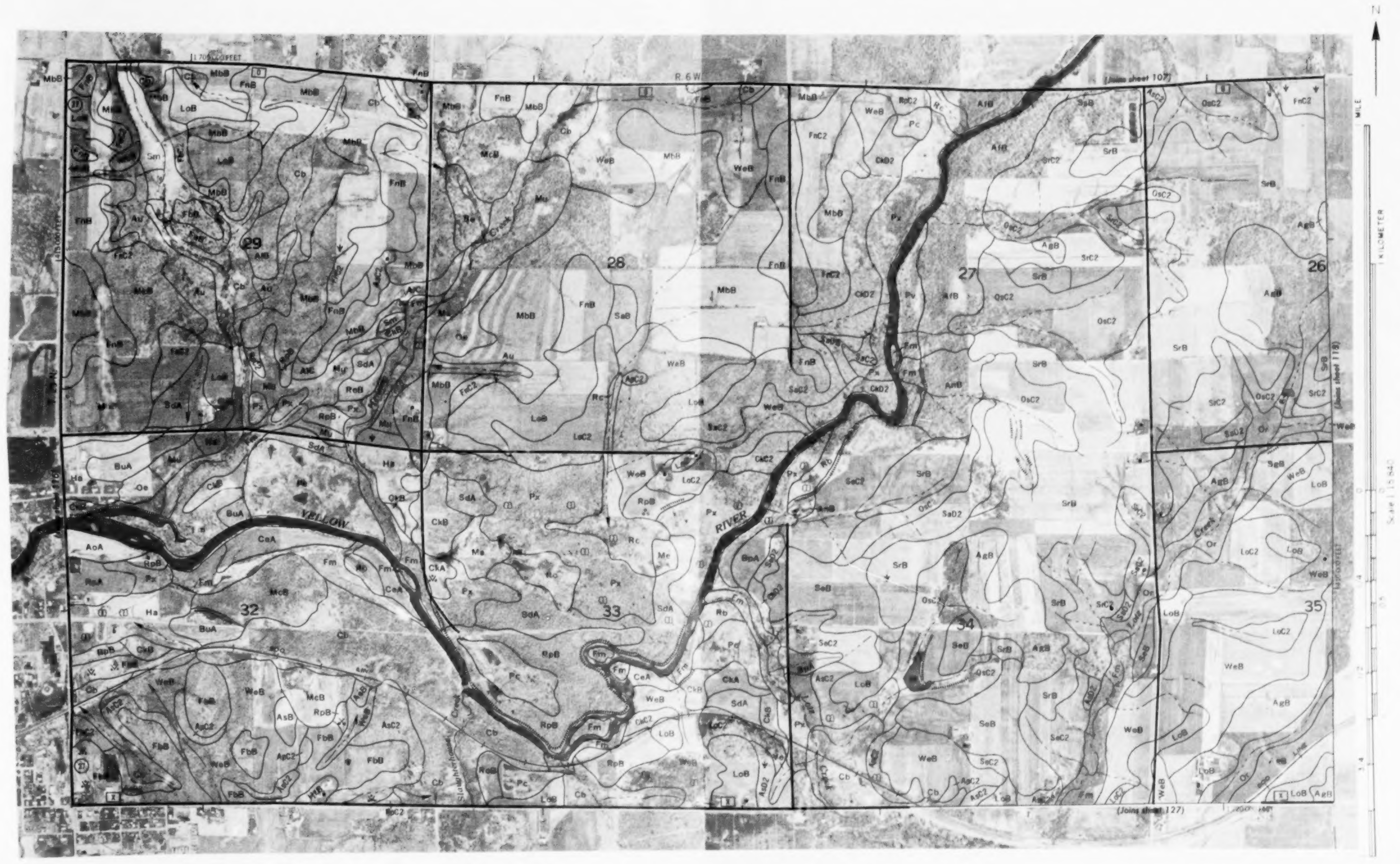
pages tightly bound

best copy available

SOIL MAP OF CHIPPEWA COUNTY WISCONSIN — SHEET NUMBER 116


N
(Joins sheet 106)
R. 7 W.
26
27
30
34
35
YELLOW
RIVER

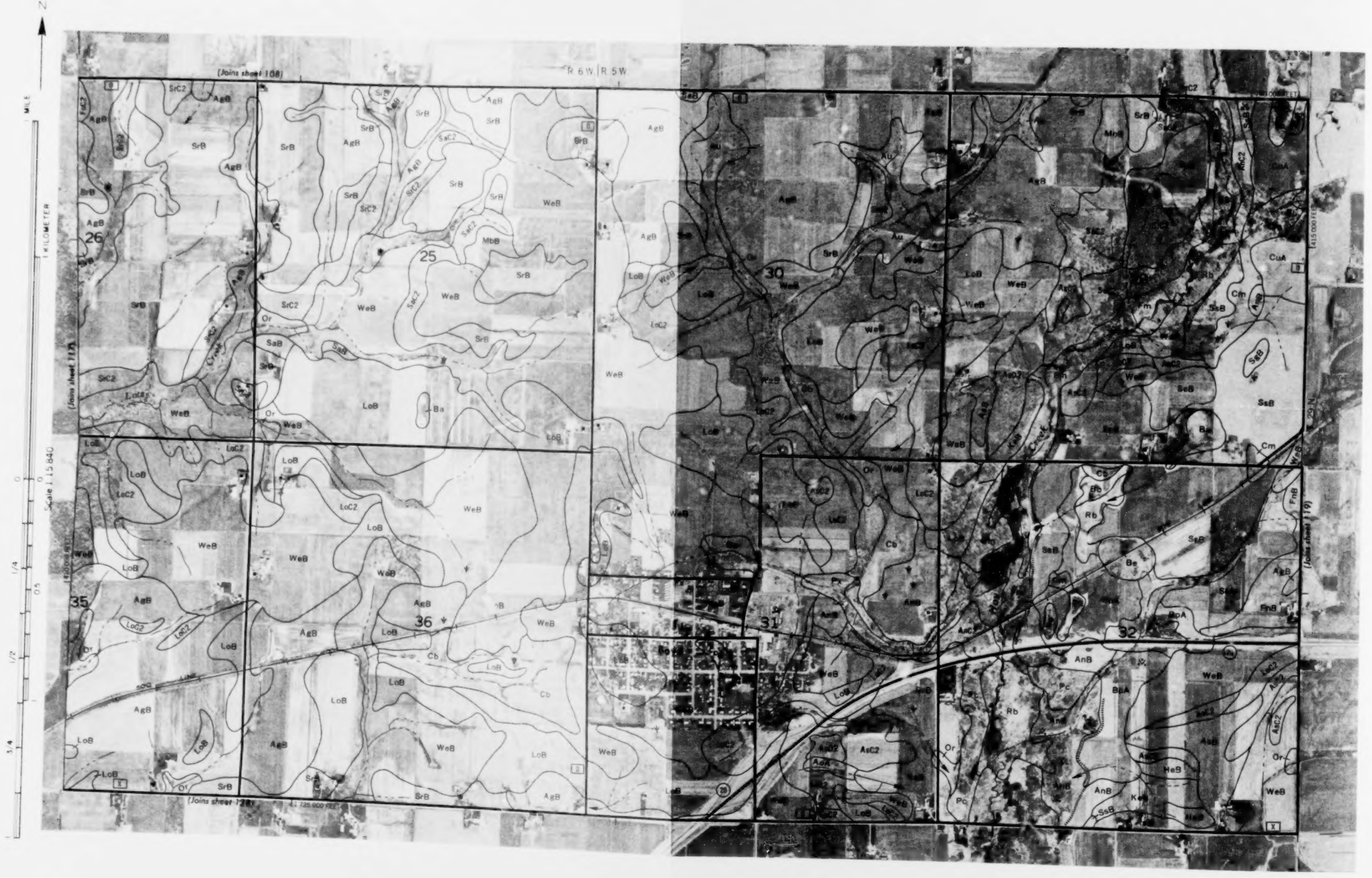
SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 117


N
R. 6 W.
(Joins sheet 107)
26
27
28
29
32
33
35
YELLOW
RIVER
(Joins sheet 127)

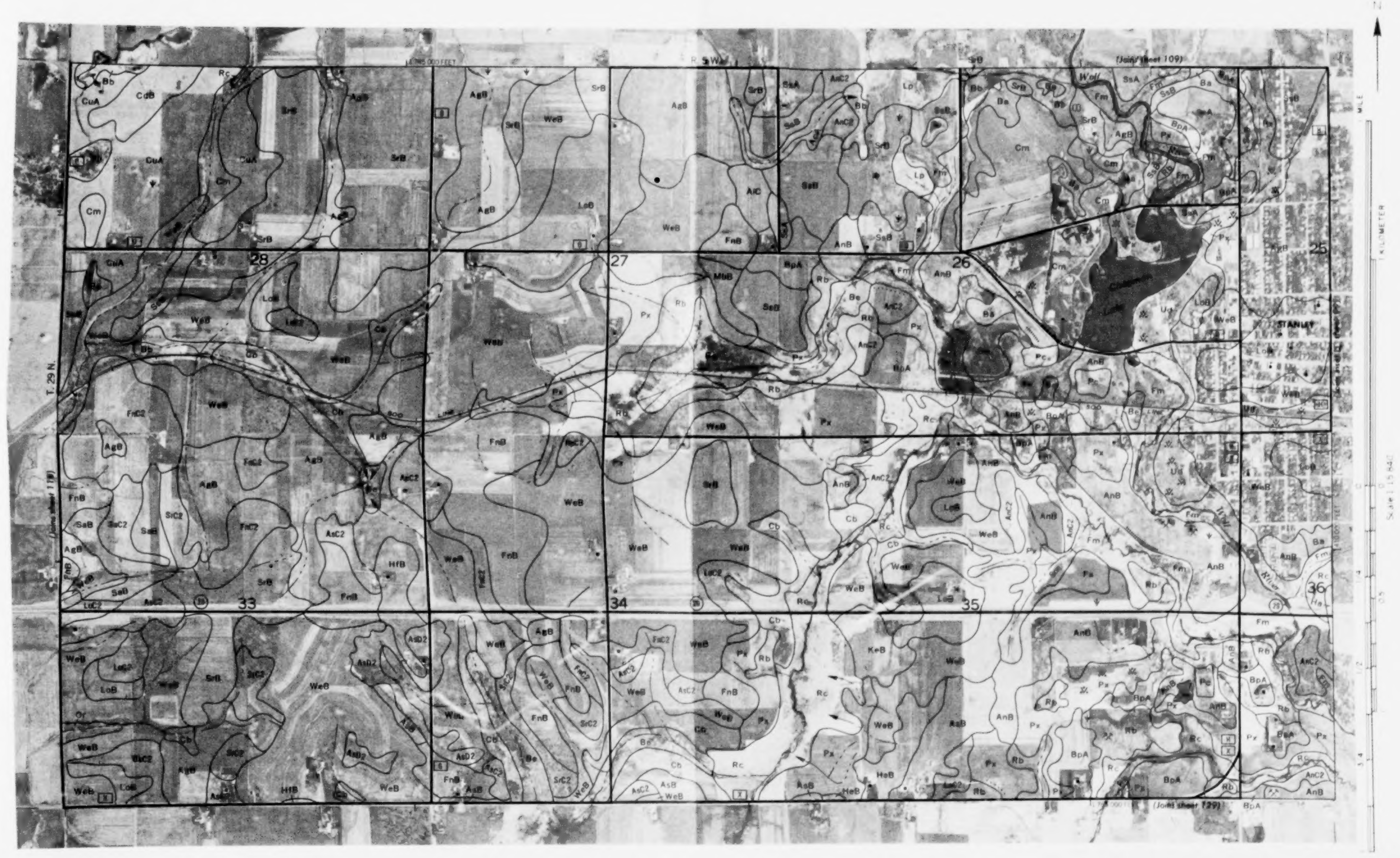
pages tightly bound

best copy available

SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 118


N
25
26
35
36
30
31
32
(Joins sheet 108)

SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 119


N
26
27
28
25
33
34
35
36
STANLEY

pages tightly bound

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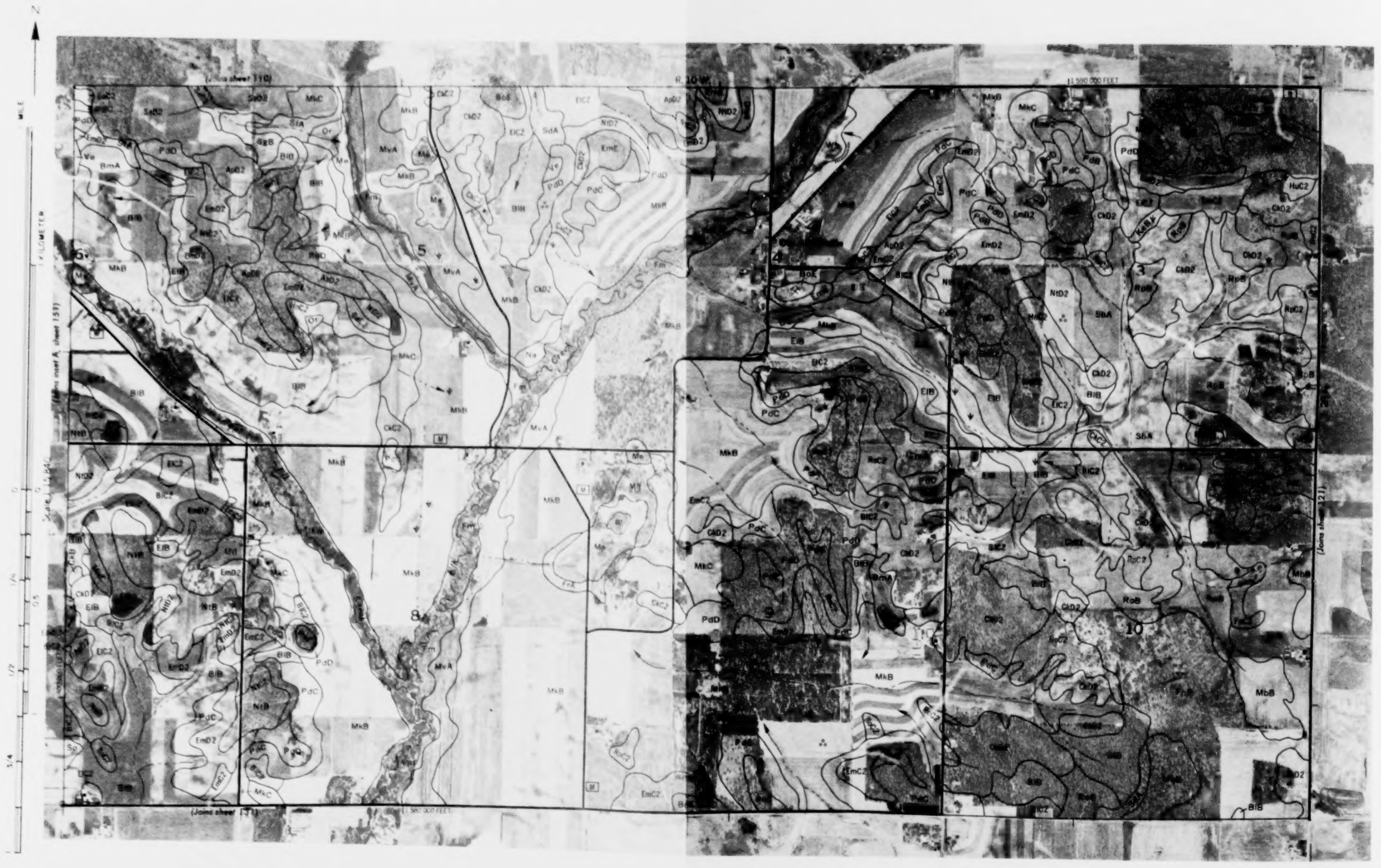
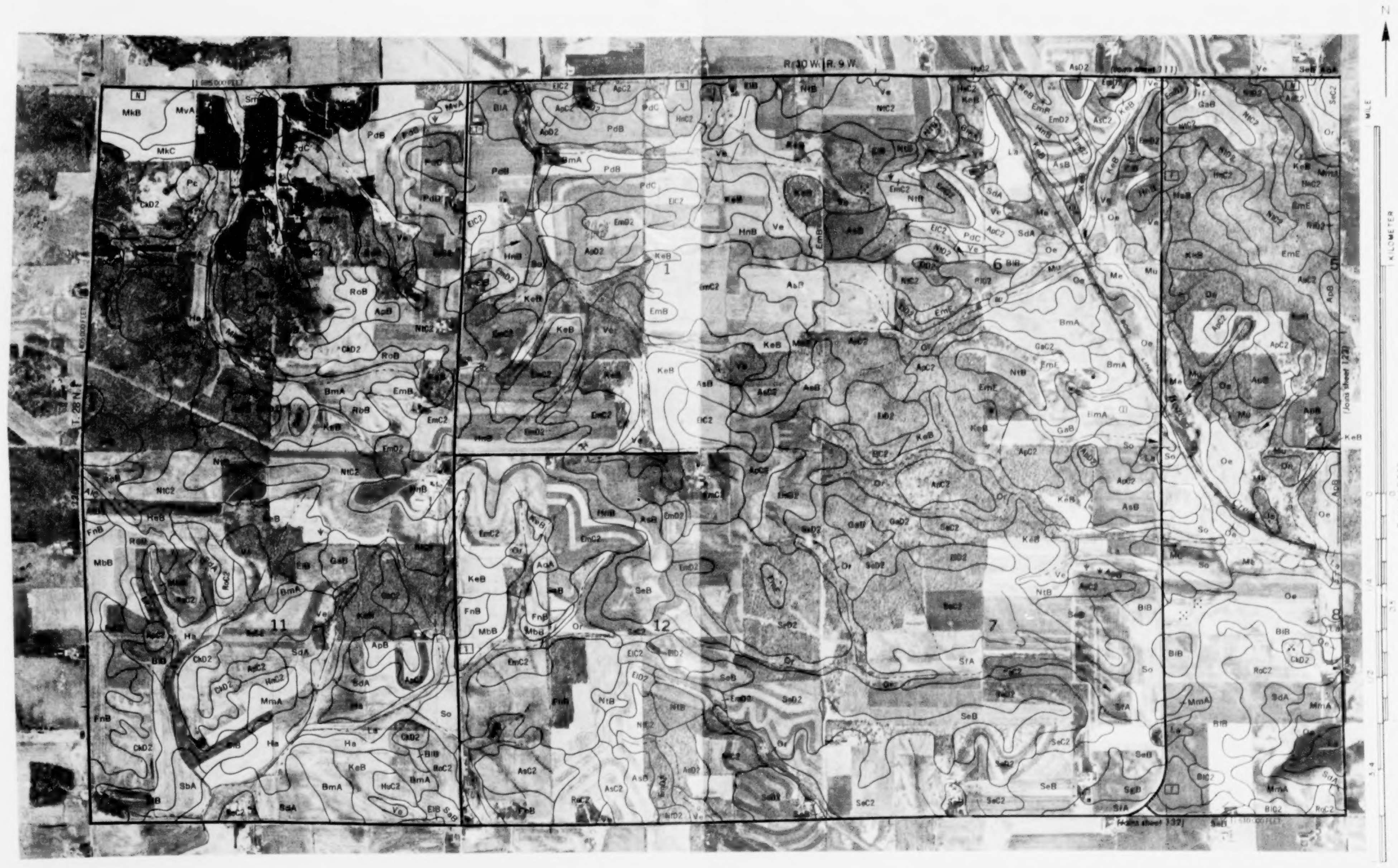
SOIL MAP OF CHIPPEWA COUNTY WISCONSIN — SHEET NUMBER 120



SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 121



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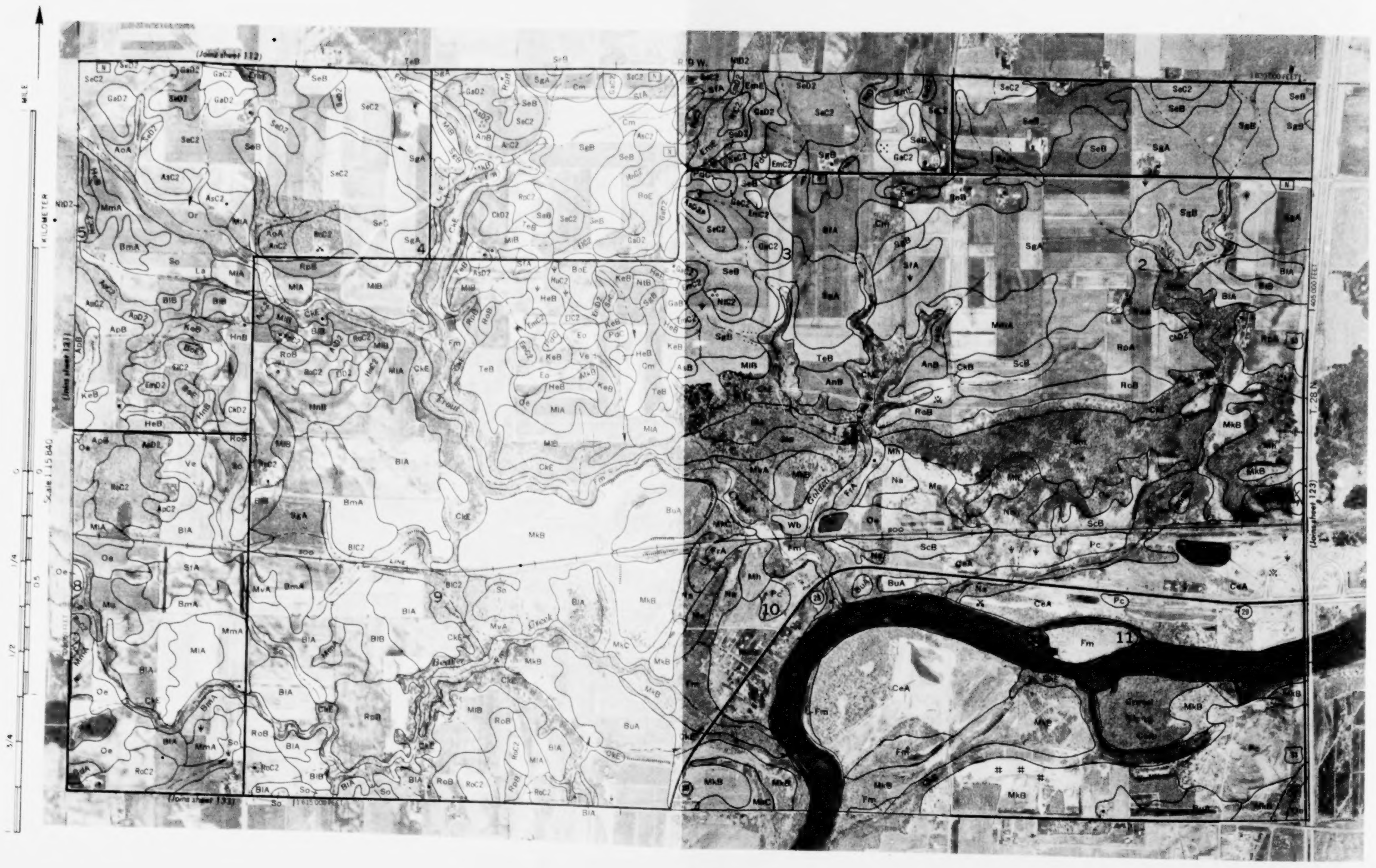
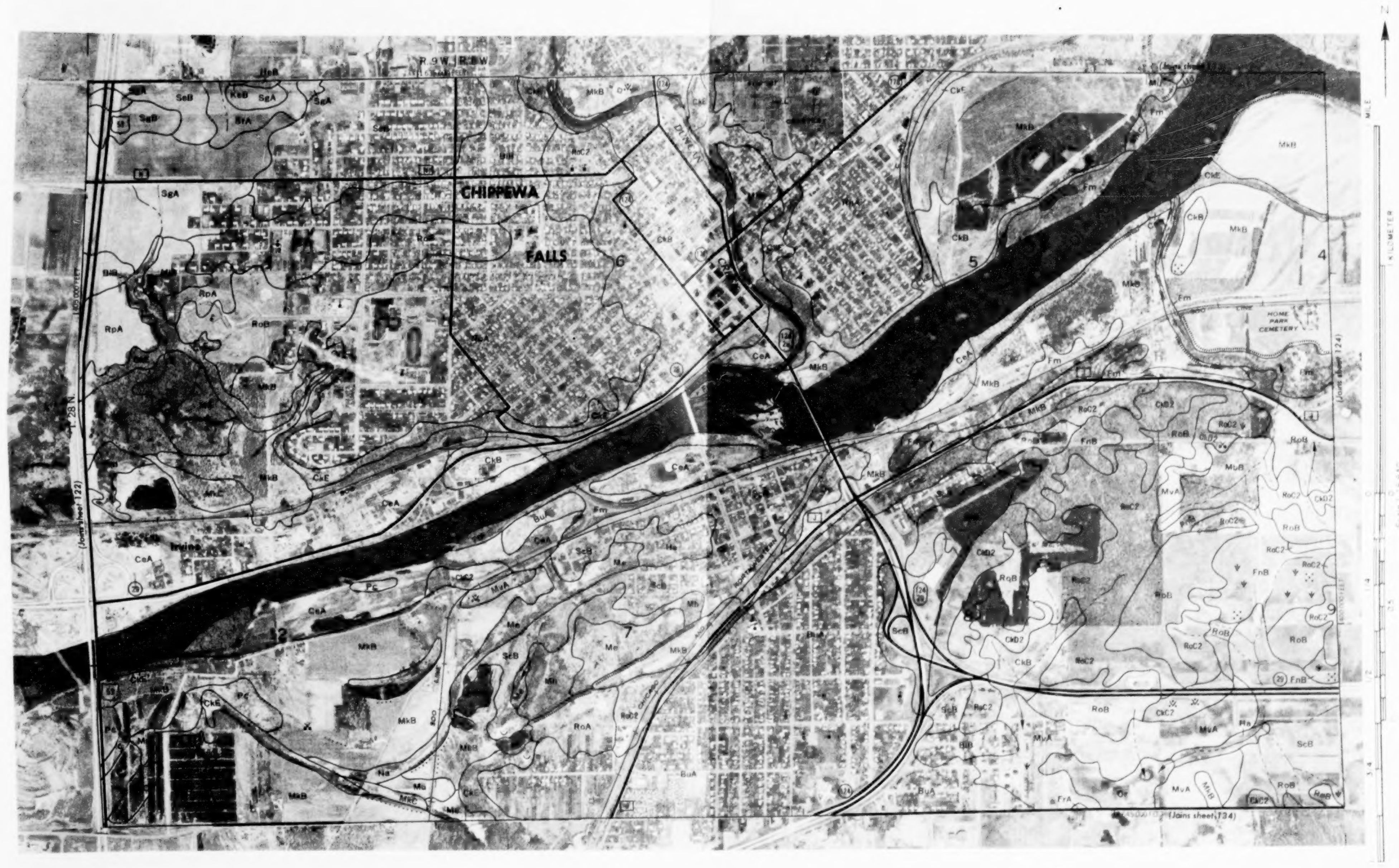
SOIL MAP OF CHIPPEWA COUNTY WISCONSIN — SHEET NUMBER 122


N
(Joins sheet 112)
R 9 W.
MILE

SOIL MAP OF CHIPPEWA COUNTY WISCONSIN — SHEET NUMBER 123


N
R 9 W. | R 8 W.
CHIPPEWA
FALLS
MILE

pages tightly bound

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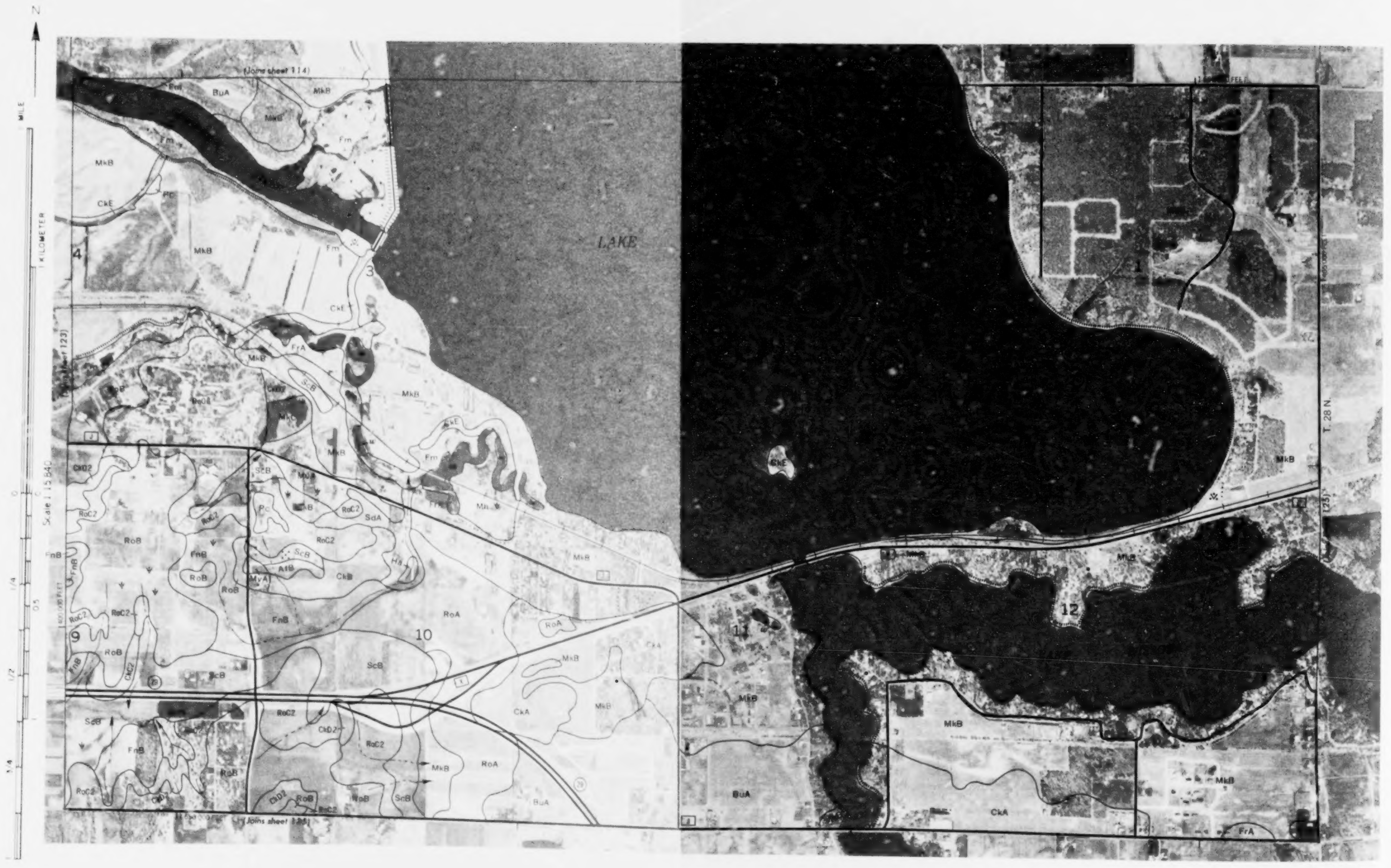
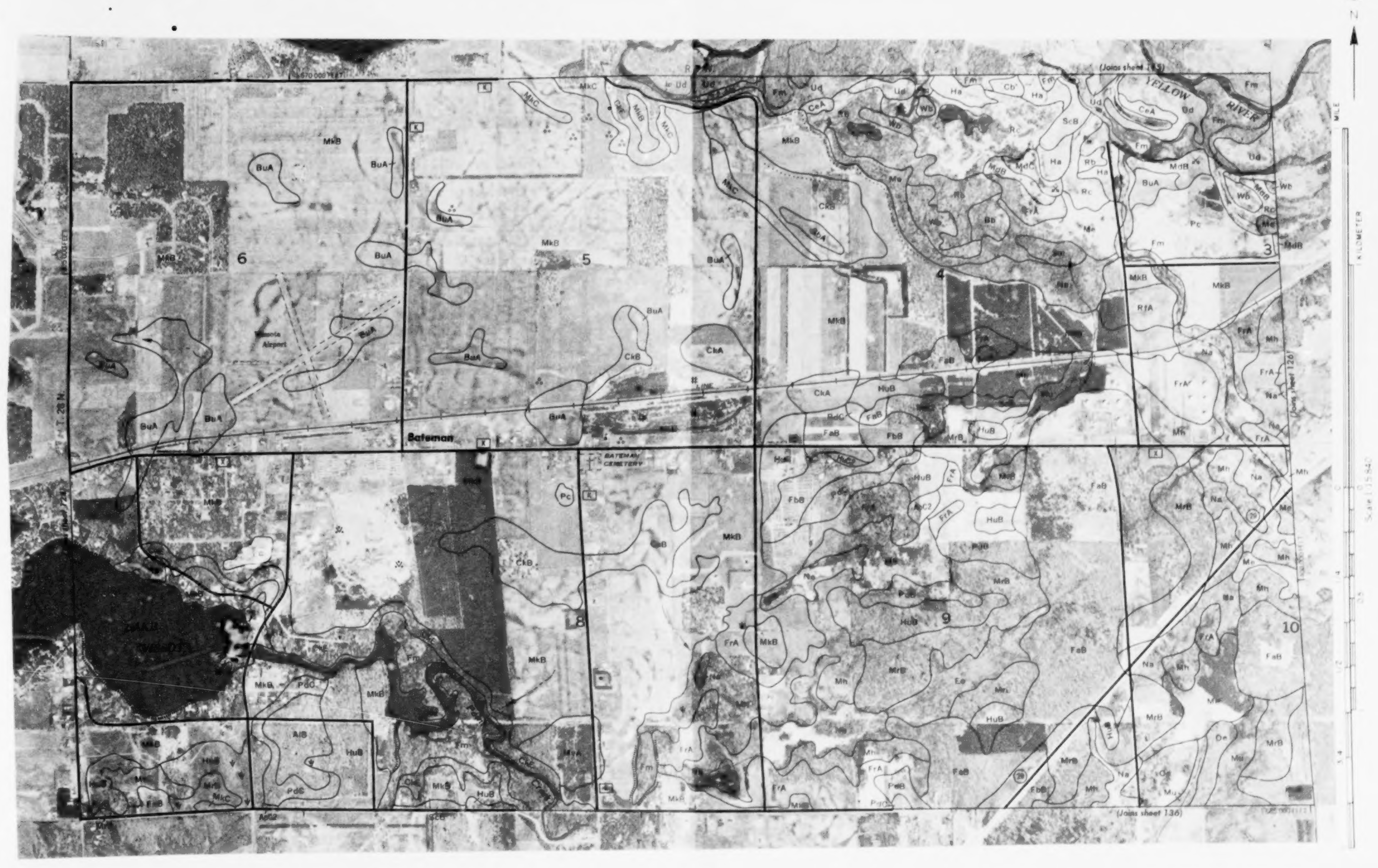
SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 124


N
MILE
KILOMETER
(Joins sheet 114)
BuA
MkB
LAKE
4
6
10
12

SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 125


N
MILE
KILOMETER
(Joins sheet 115)
YELLOW RIVER
Bateman
6
5
9
10
MkB
MkC
CeA
Ud
Fm
Ha

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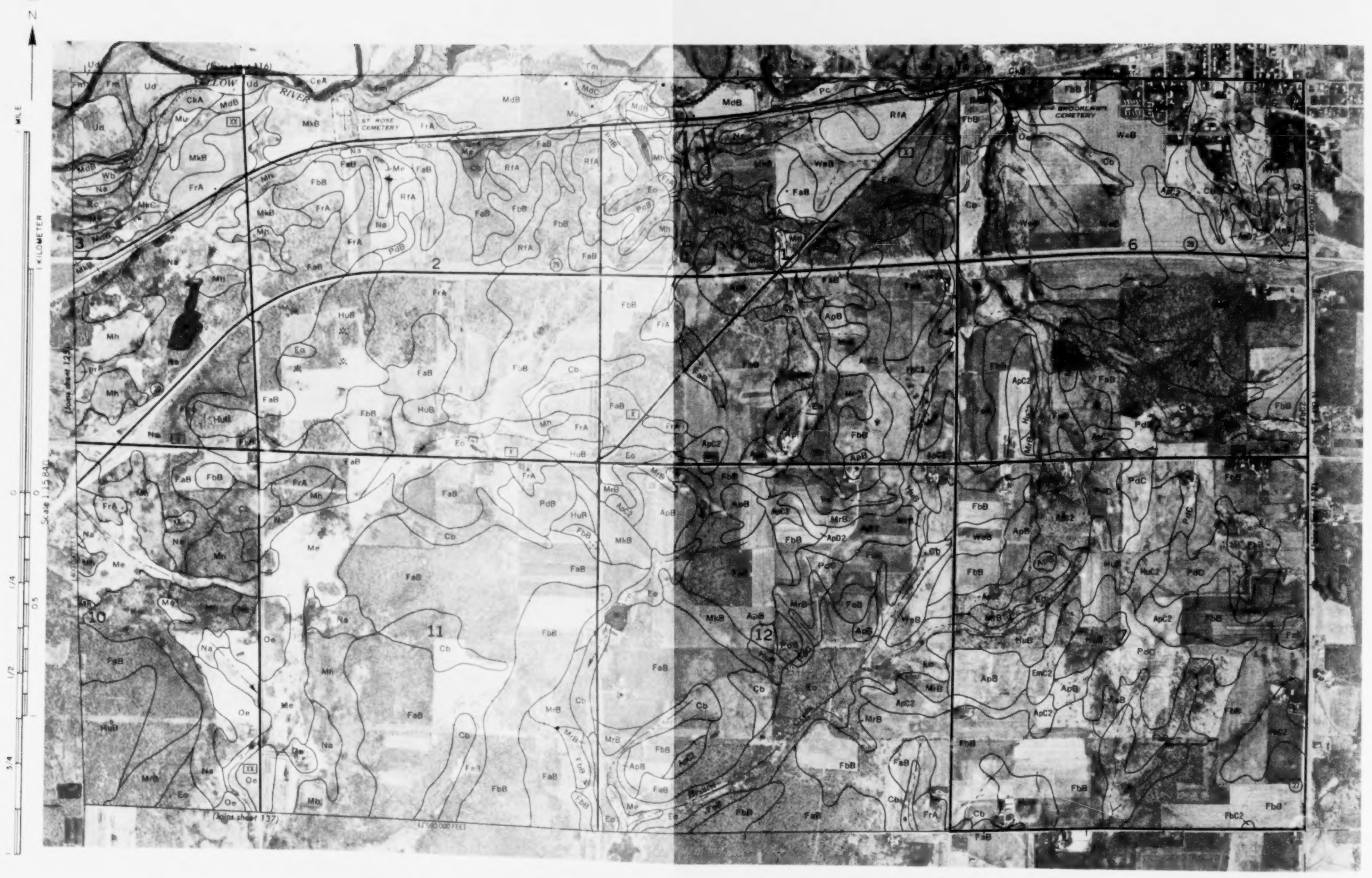
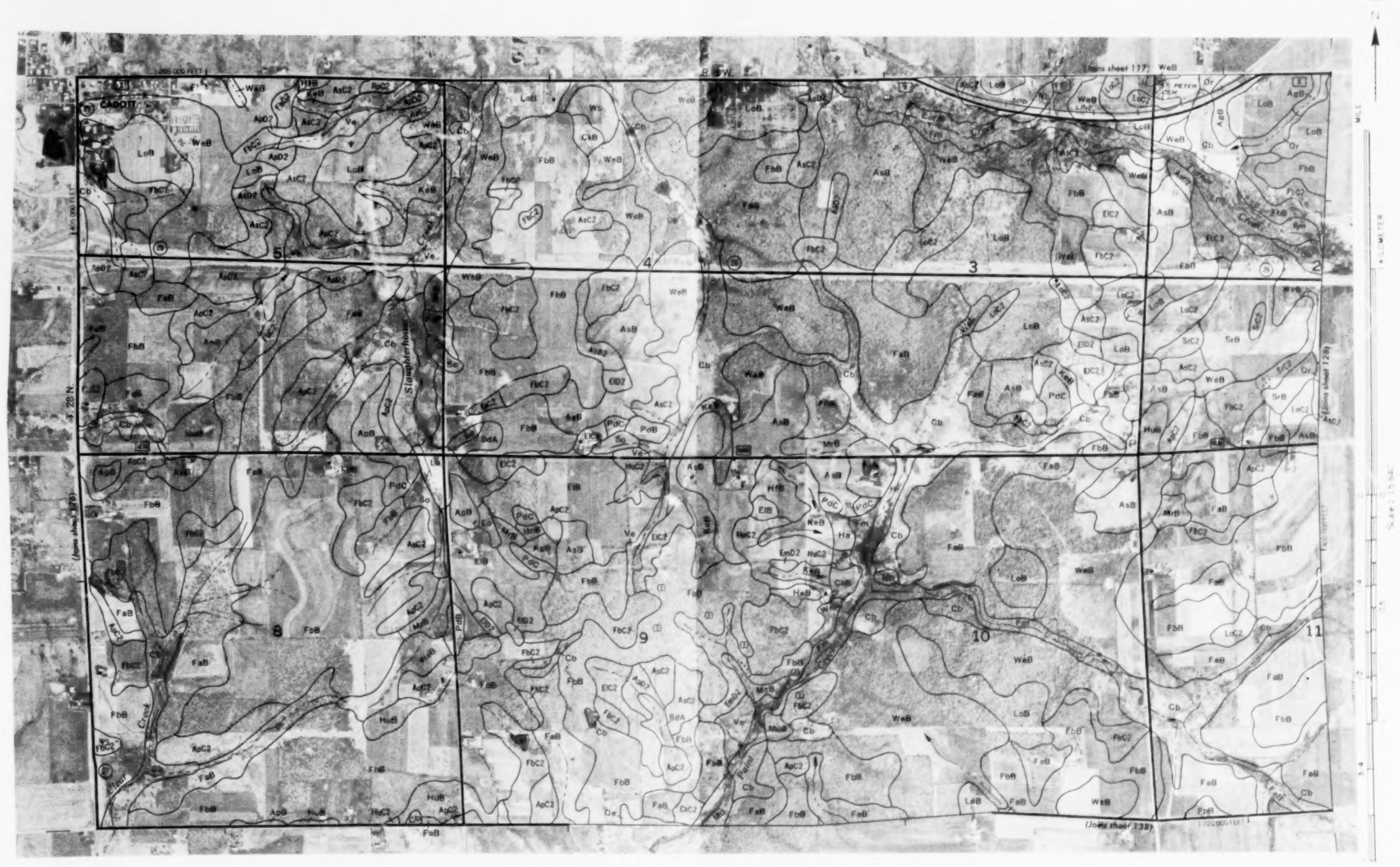
SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 126



SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 127



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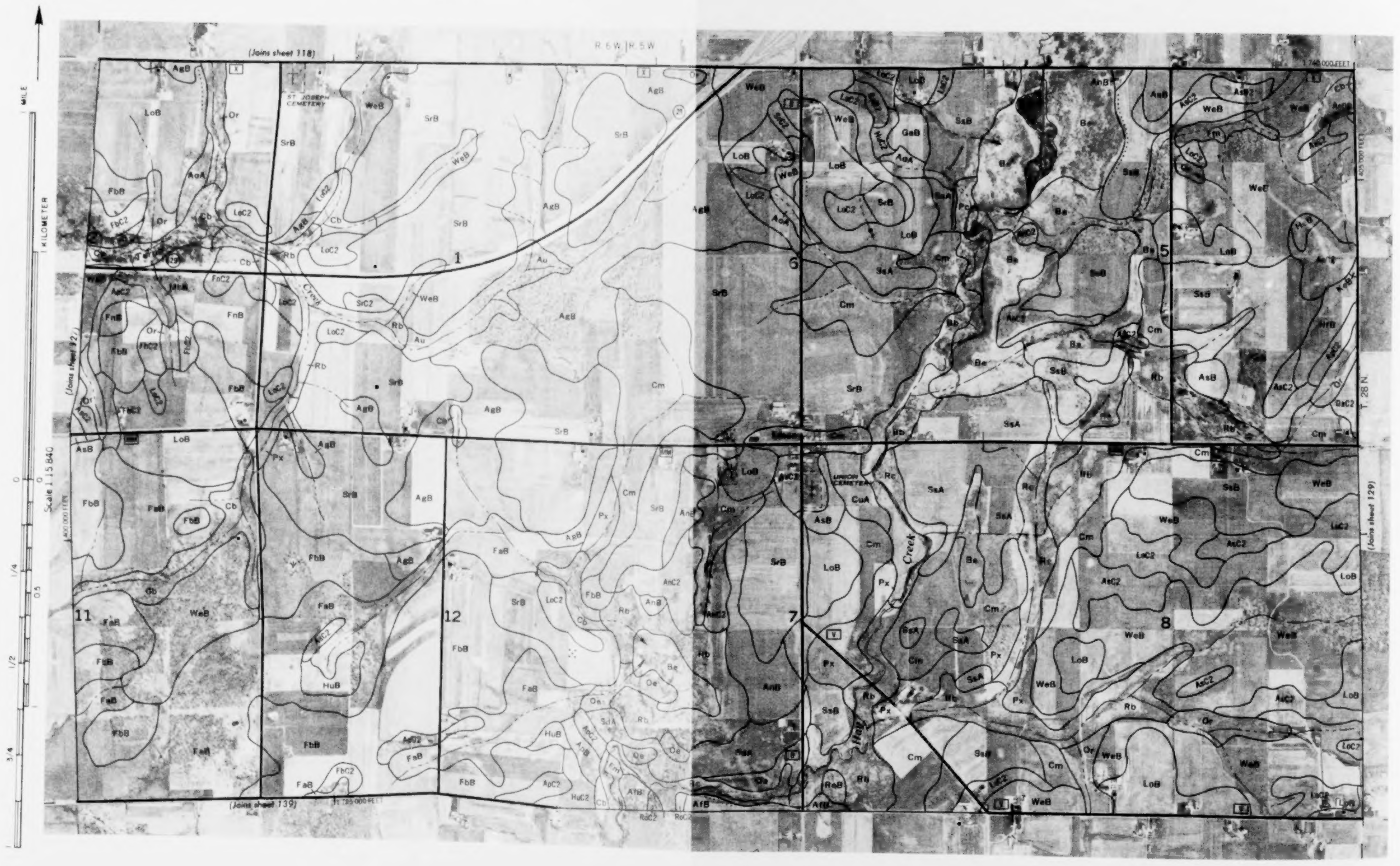
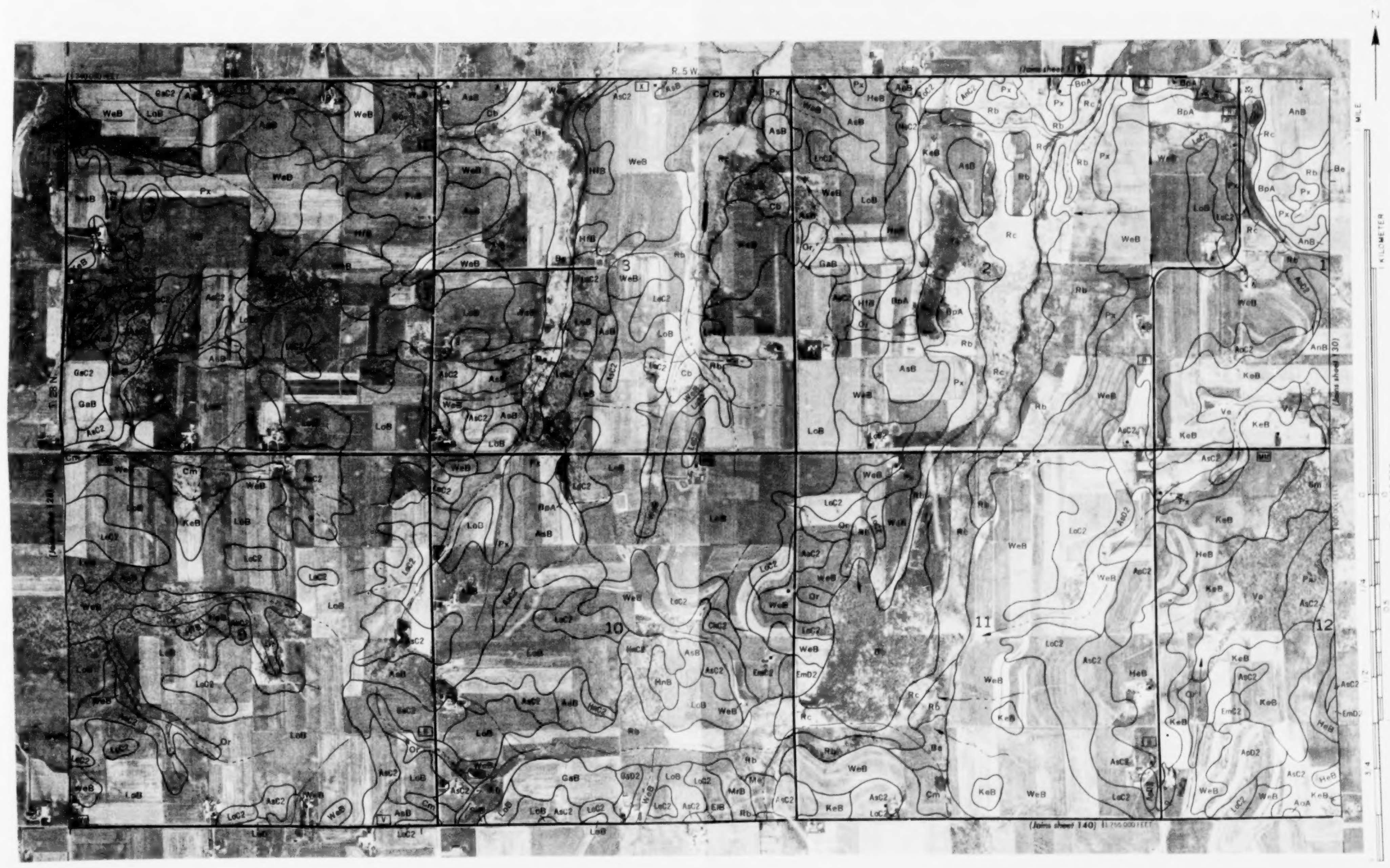
SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 128


N
(Joins sheet 118)
R. 6 W. | R. 5 W.
ST JOSEPH CEMETERY
1
6
11
12
7
8
(Joins sheet 129)
(Joins sheet 139)

SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 129


N
R. 5 W.
3
2
1
10
11
12
(Joins sheet 140)

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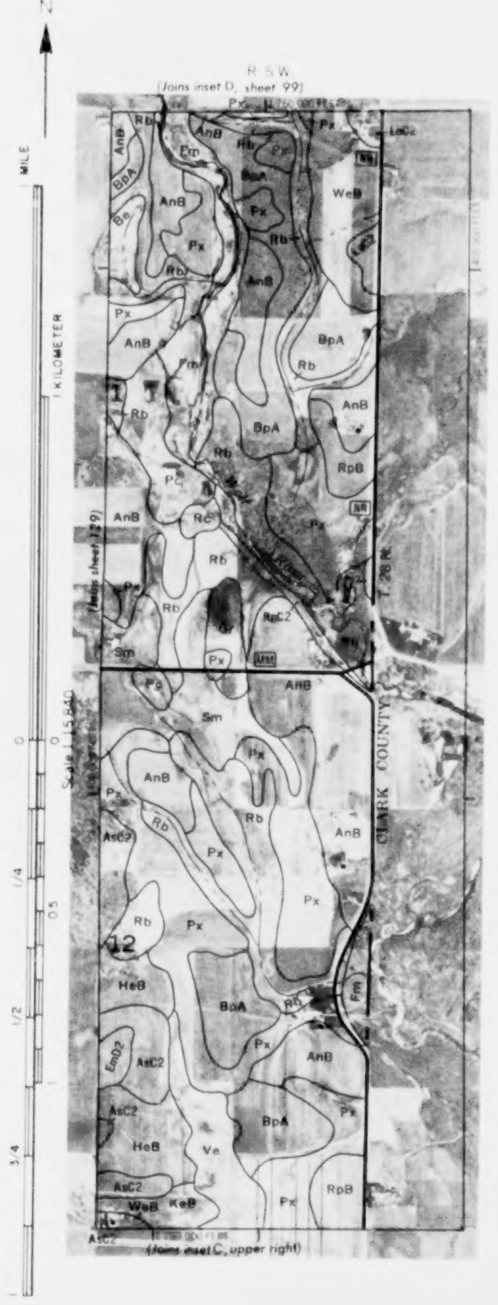
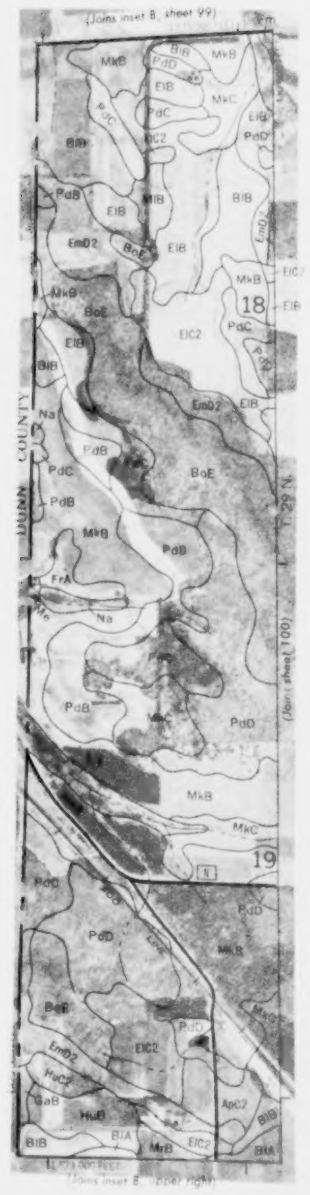
SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 130

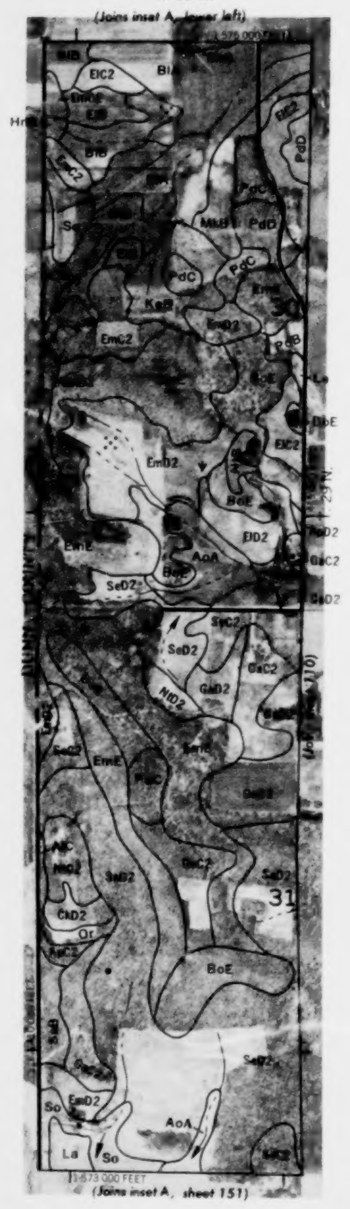
R. 5 W.


(Joins inset D, sheet 99)
(Joins inset C, upper right)

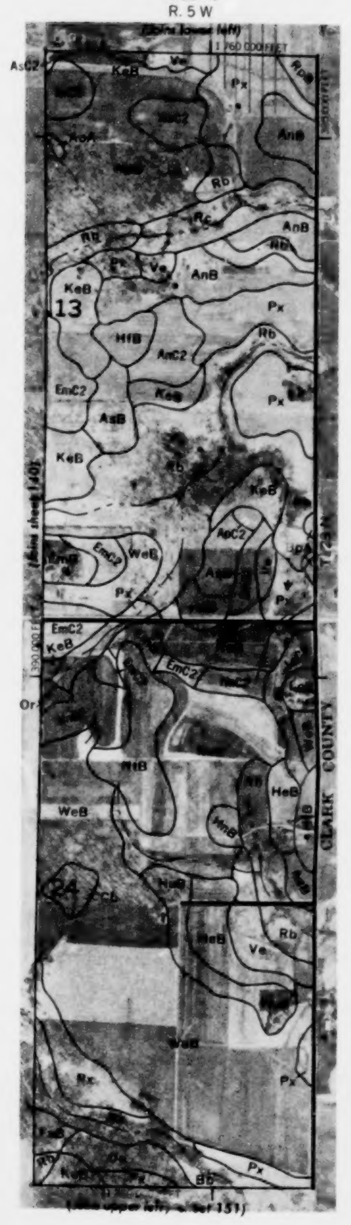
INSET A
R. 10 W.


(Joins inset B, sheet 99)

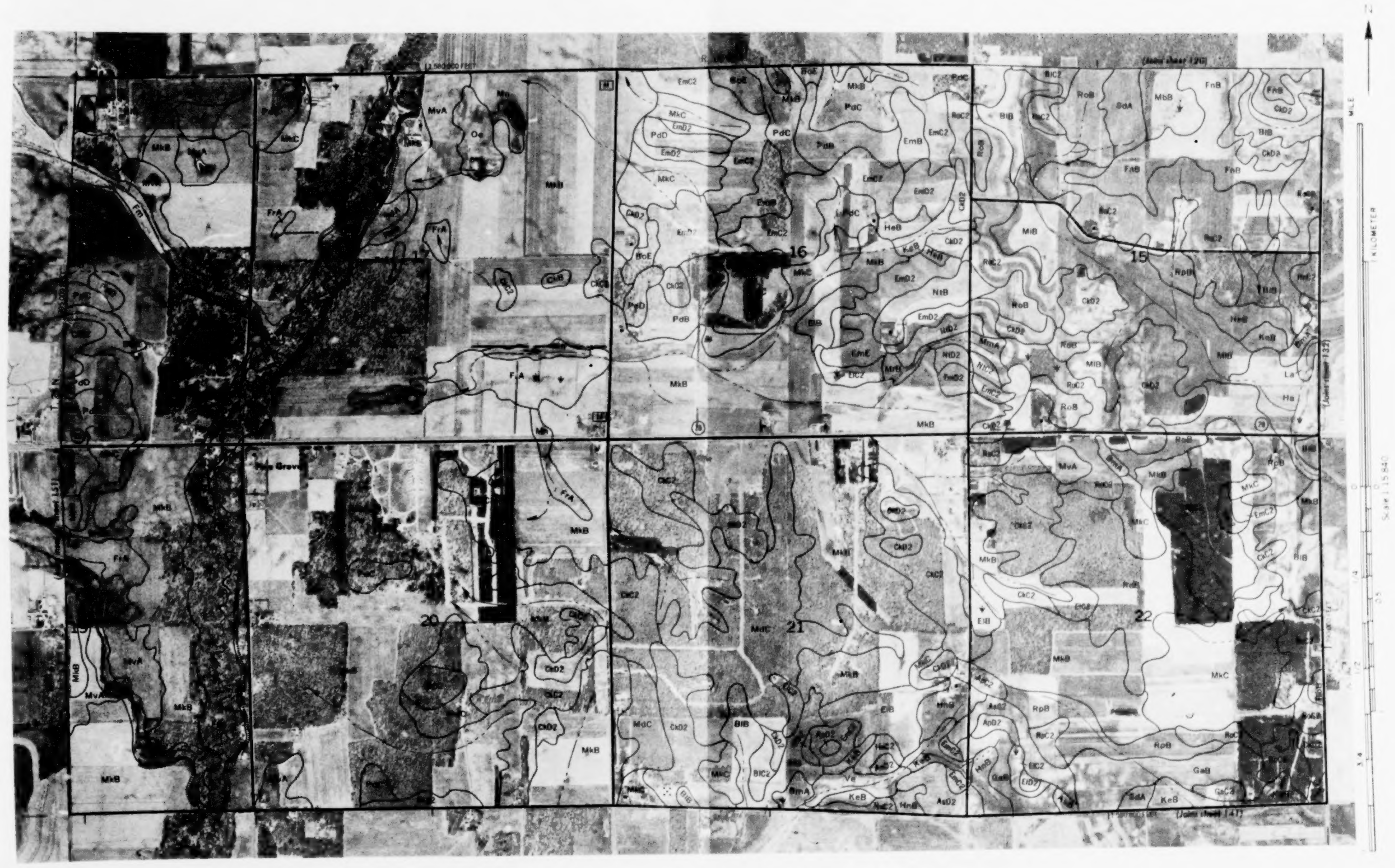
INSET B
R. 10 W.


(Joins inset A, lower left)
(Joins inset A, sheet 151)

INSET C
R. 5 W.


(Joins lower left)

SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 131


(Joins sheet 120)
(Joins sheet 141)

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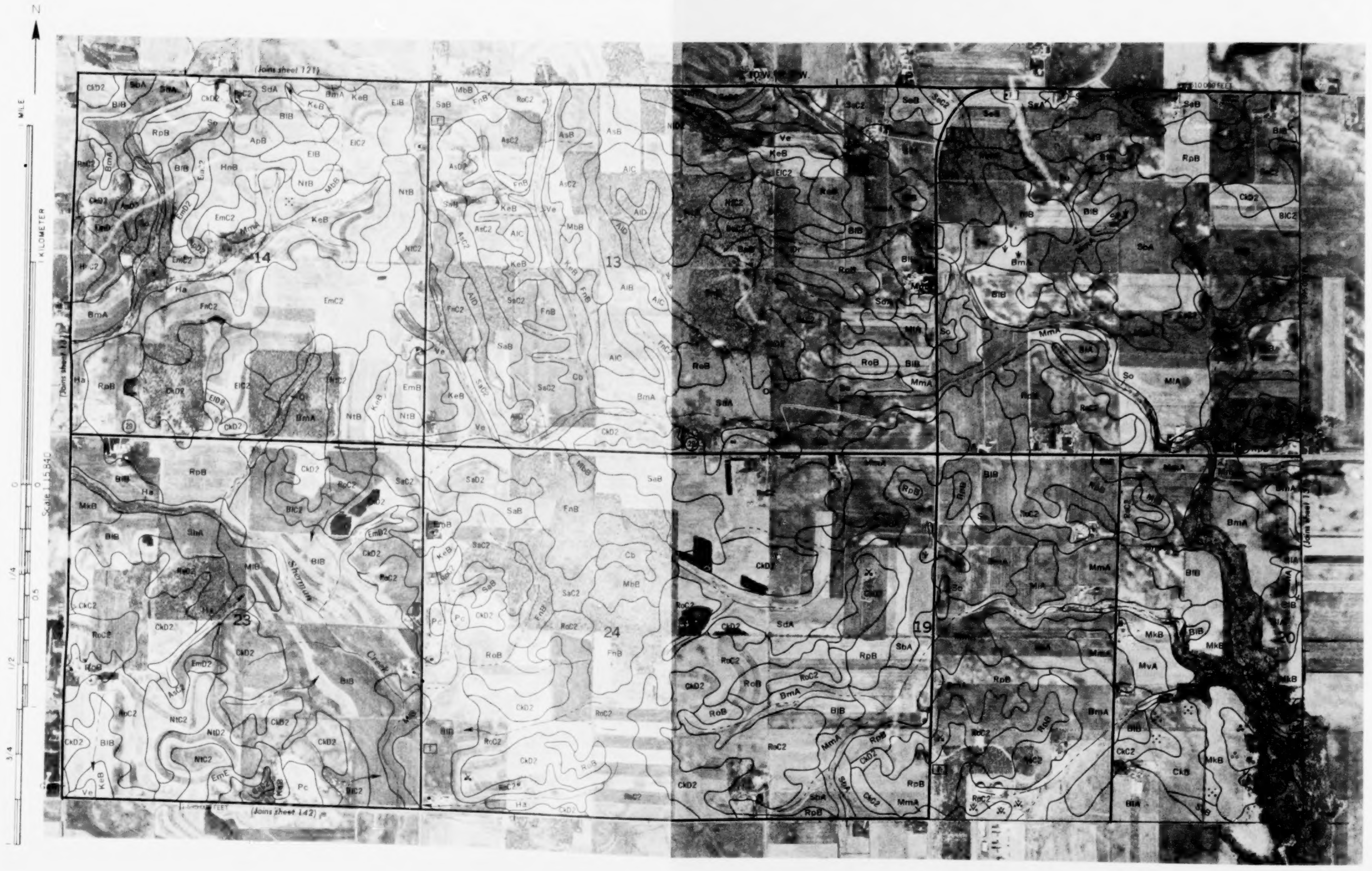
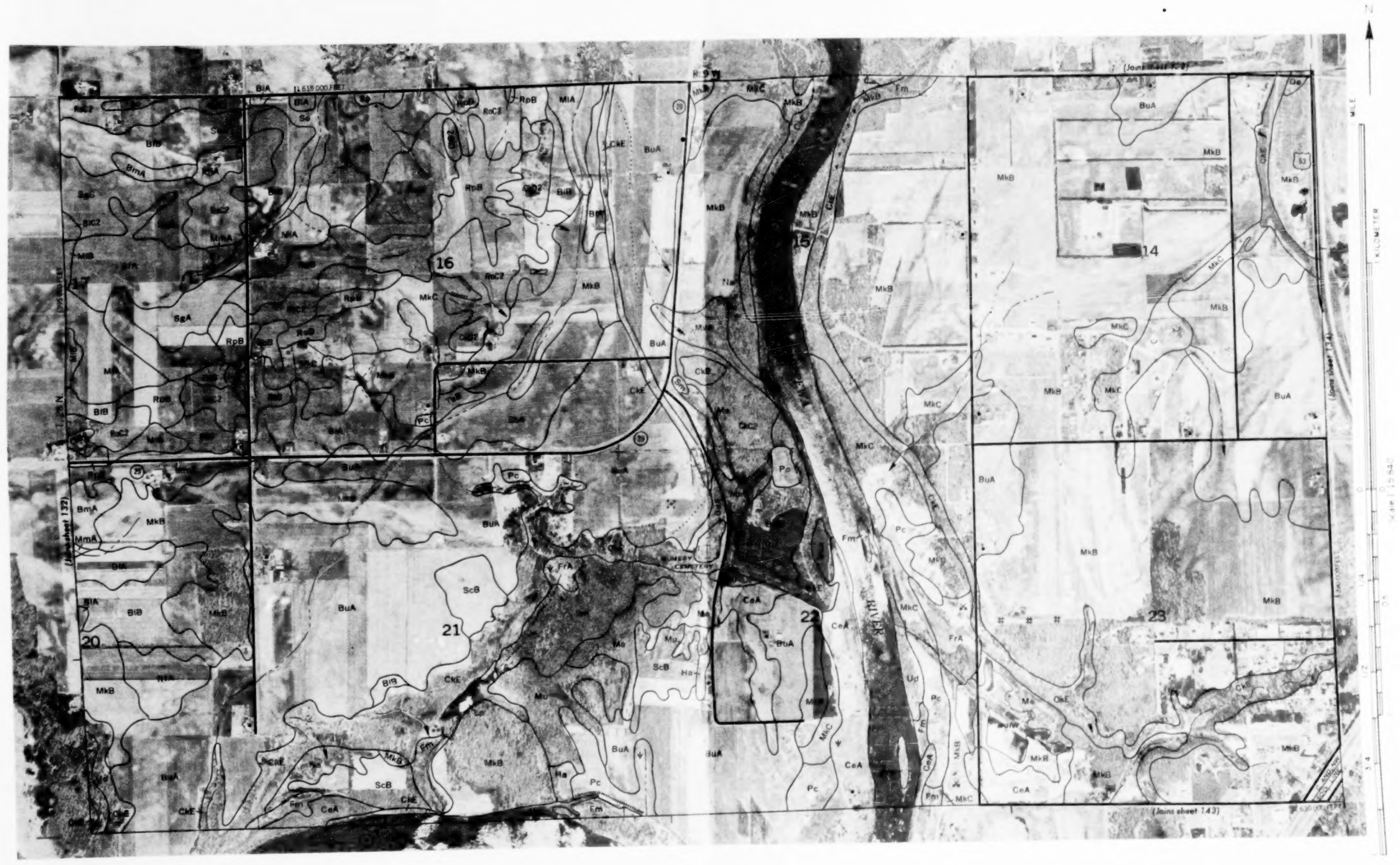
SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 132



SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 133



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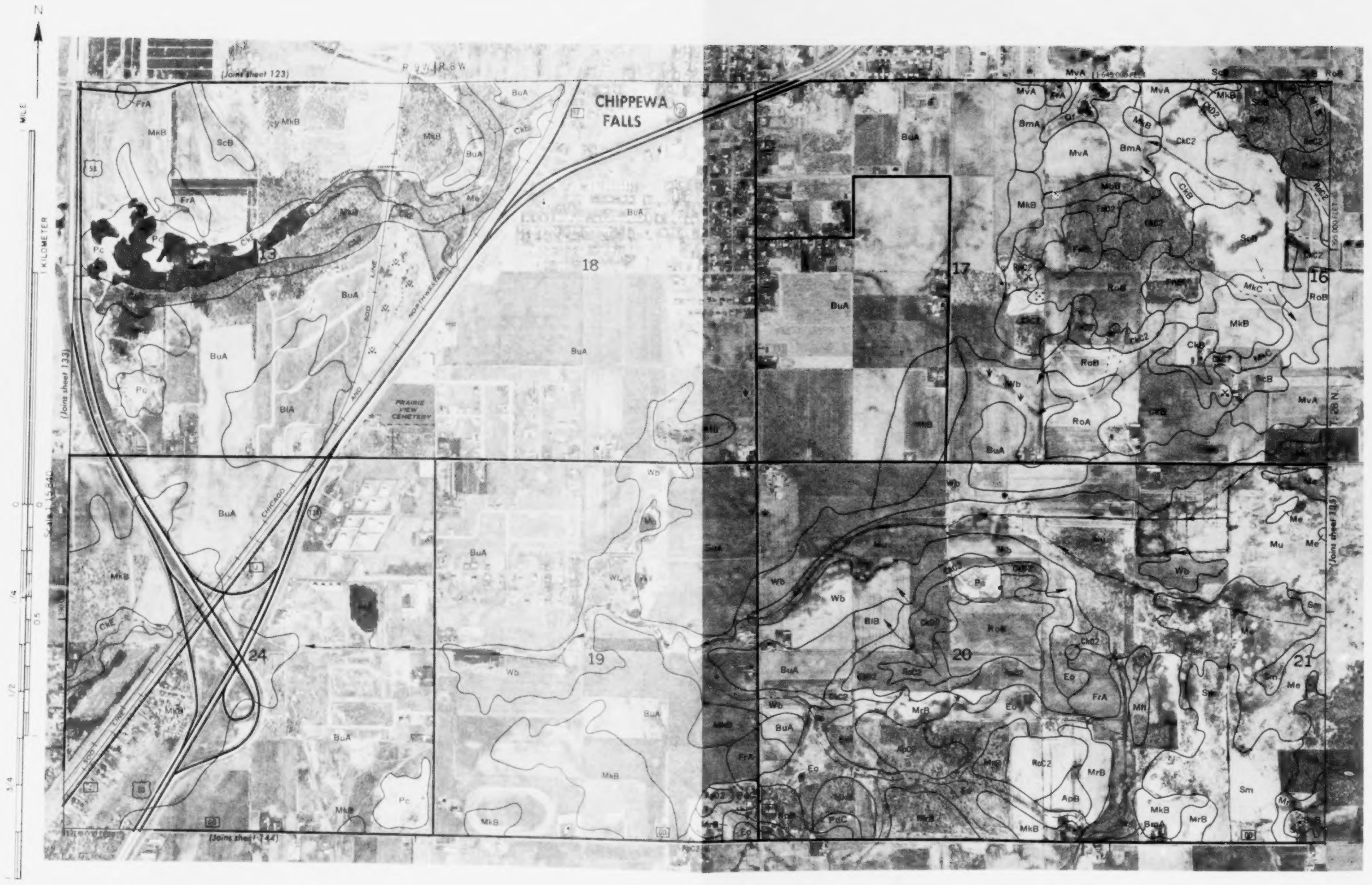
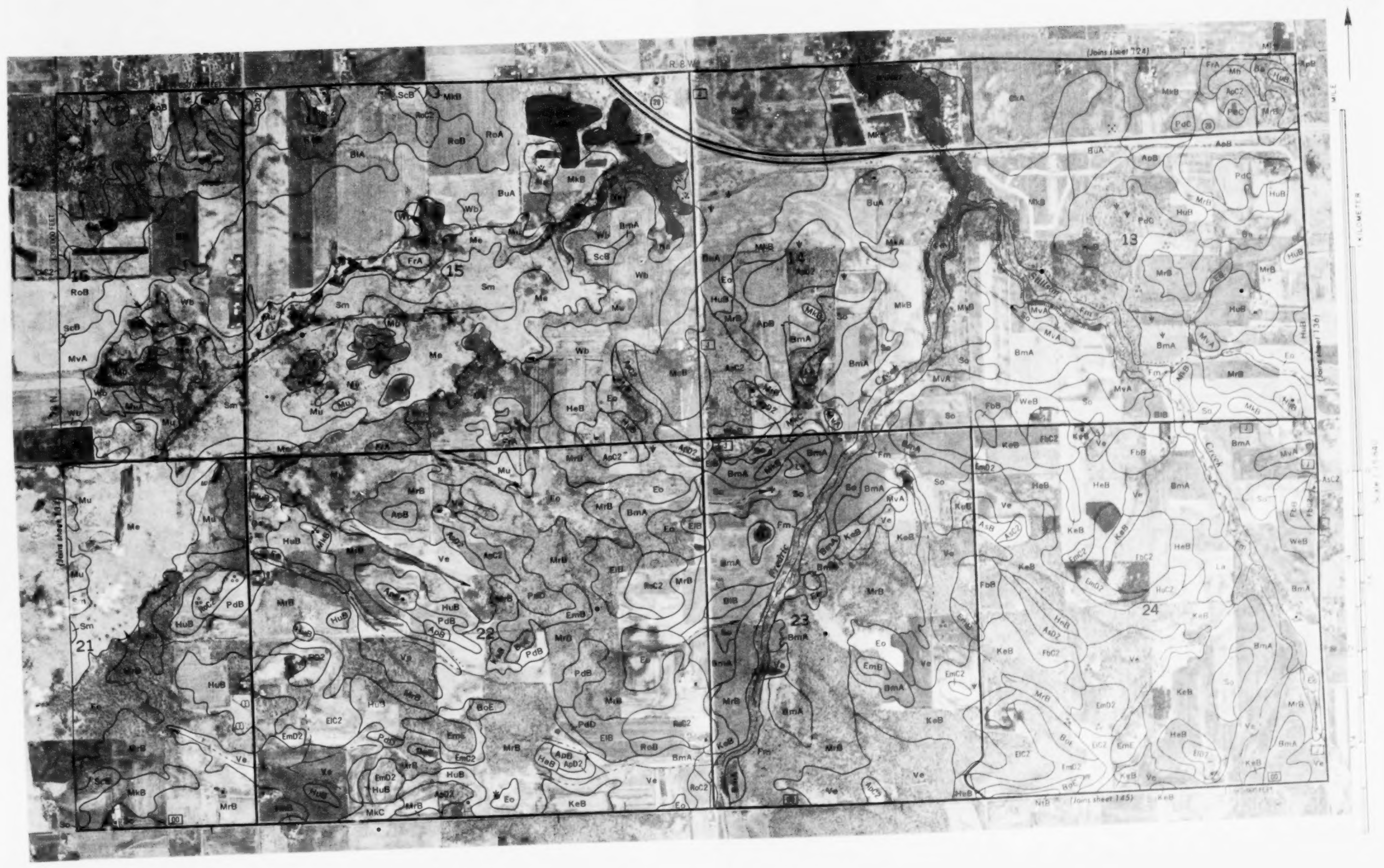
SOIL MAP OF CHIPPEWA COUNTY WISCONSIN — SHEET NUMBER 134


CHIPPEWA FALLS
N
16
17
18
19
20
21
24

SOIL MAP OF CHIPPEWA COUNTY WISCONSIN — SHEET NUMBER 135


N
13
15
16
21
22
23
24

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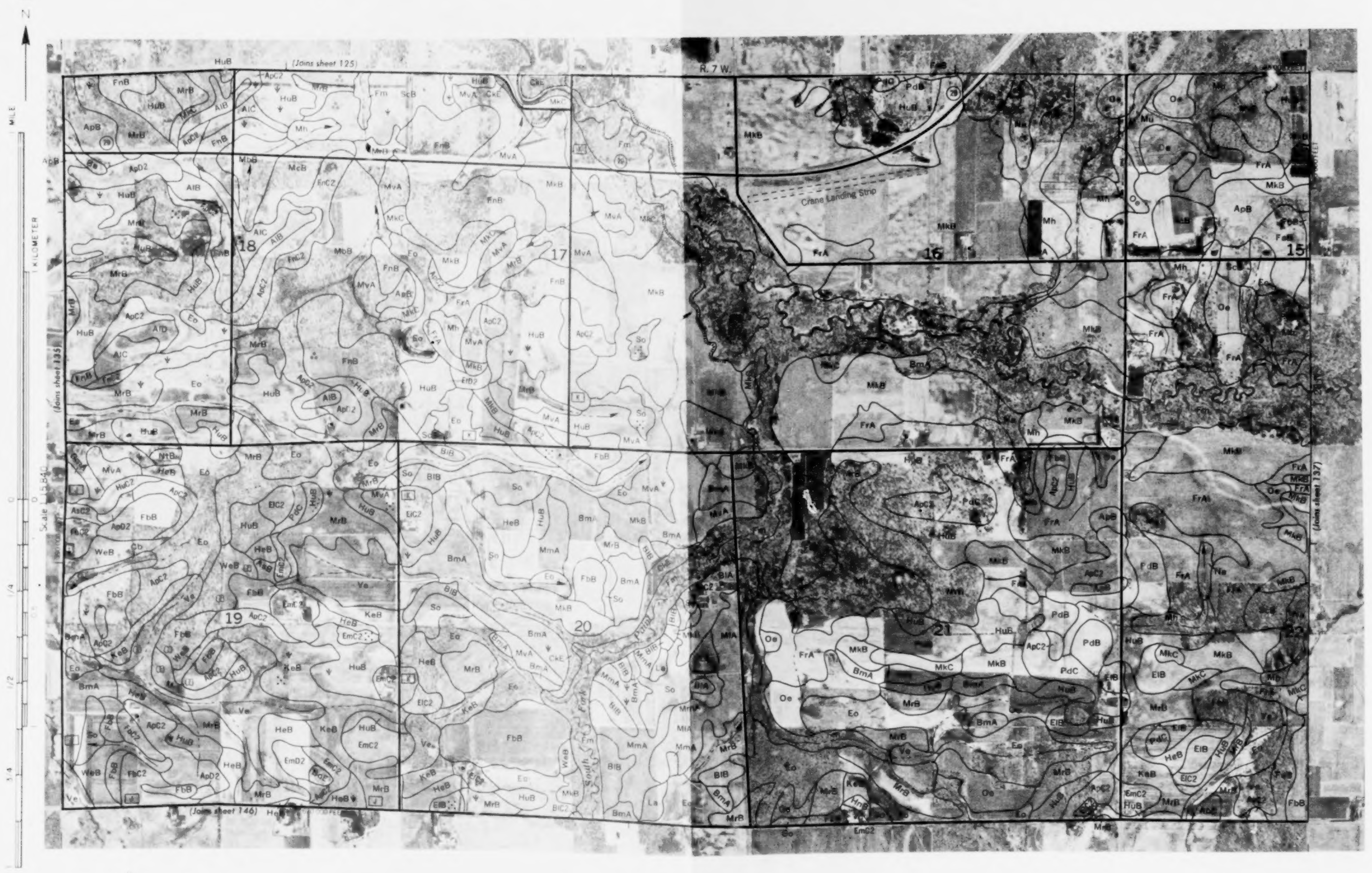
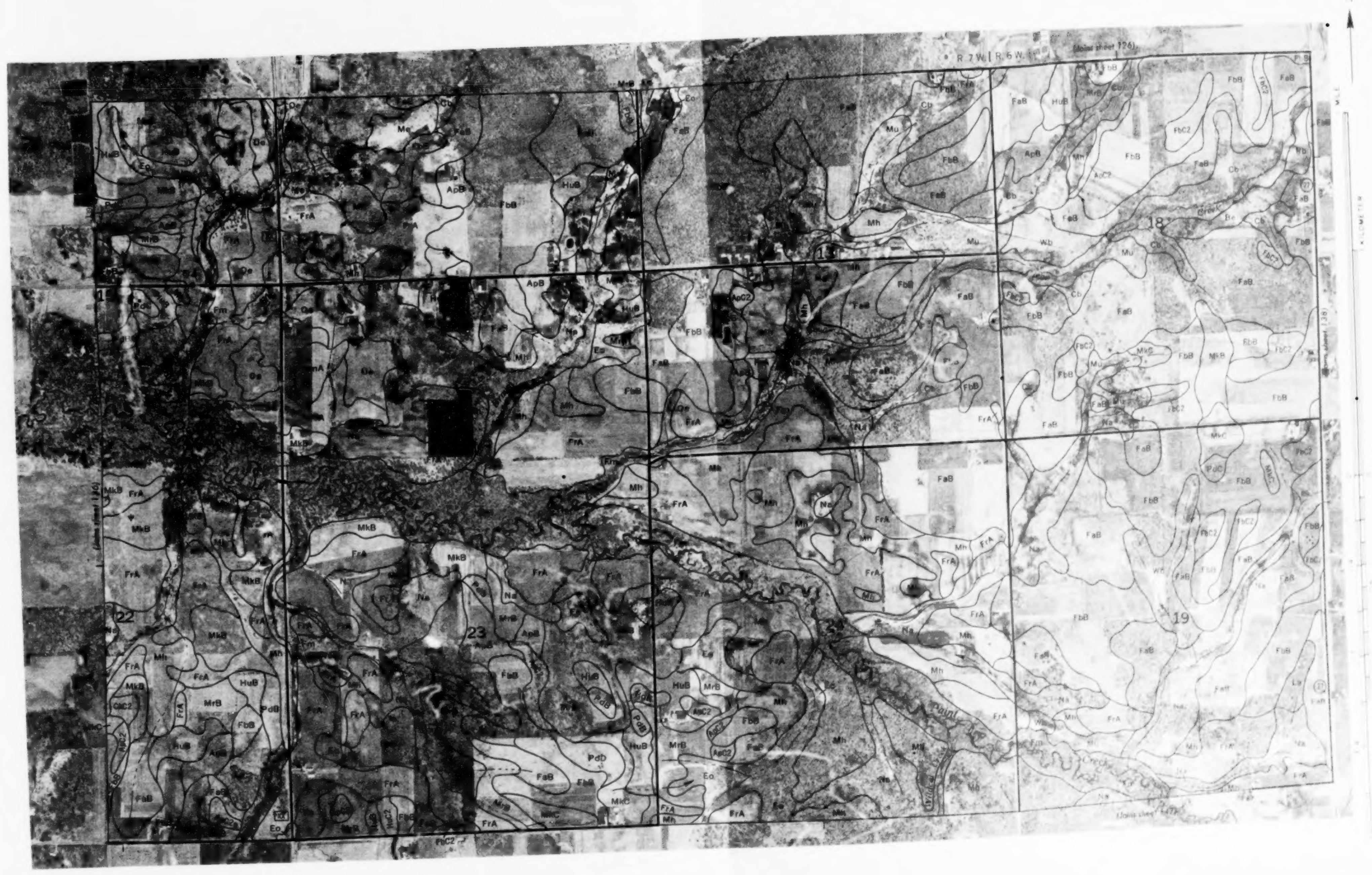
SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 136


N
(Joins sheet 125)
R. 7 W.
18
17
16
15
19
20
(Joins sheet 146)

SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 137



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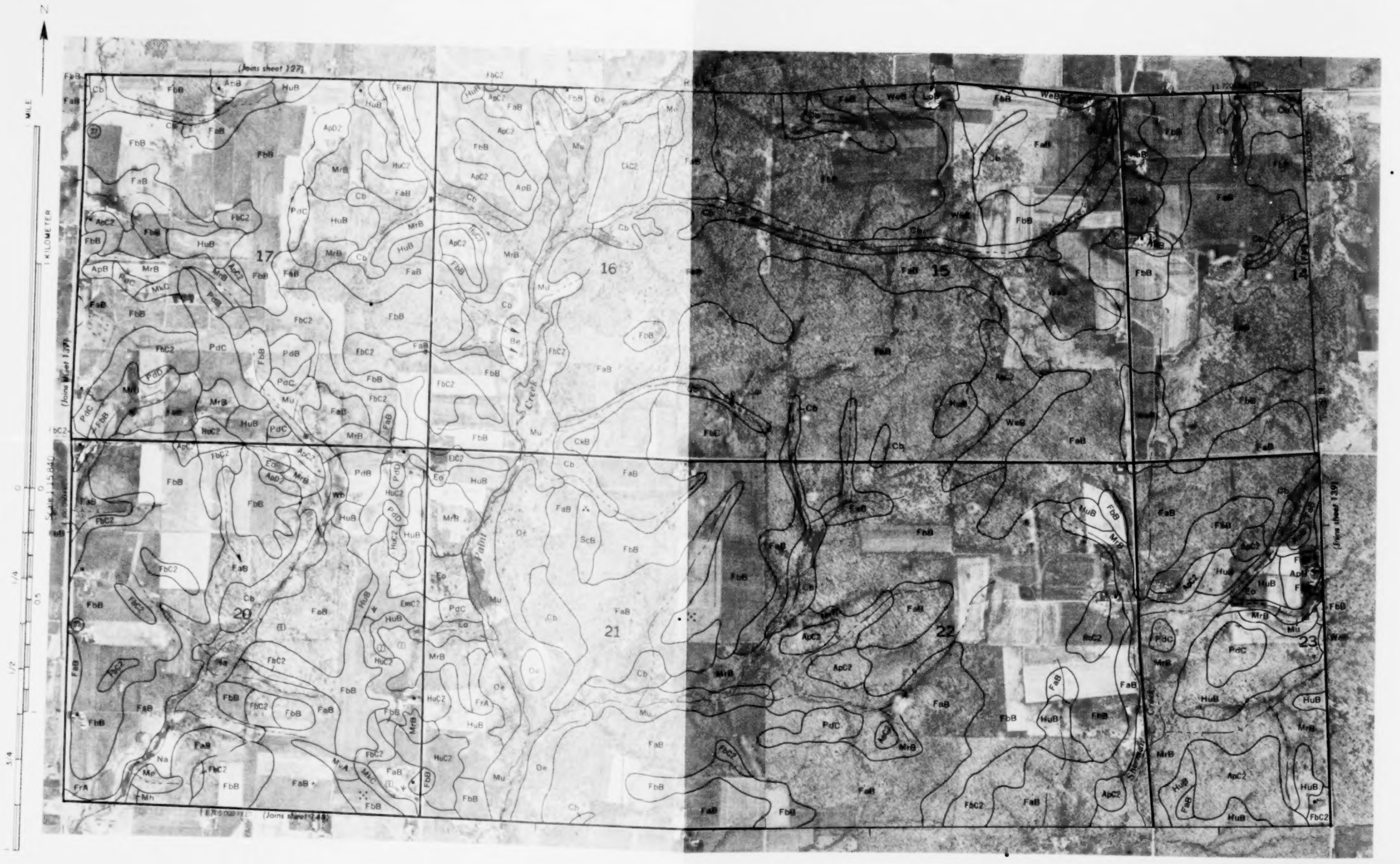
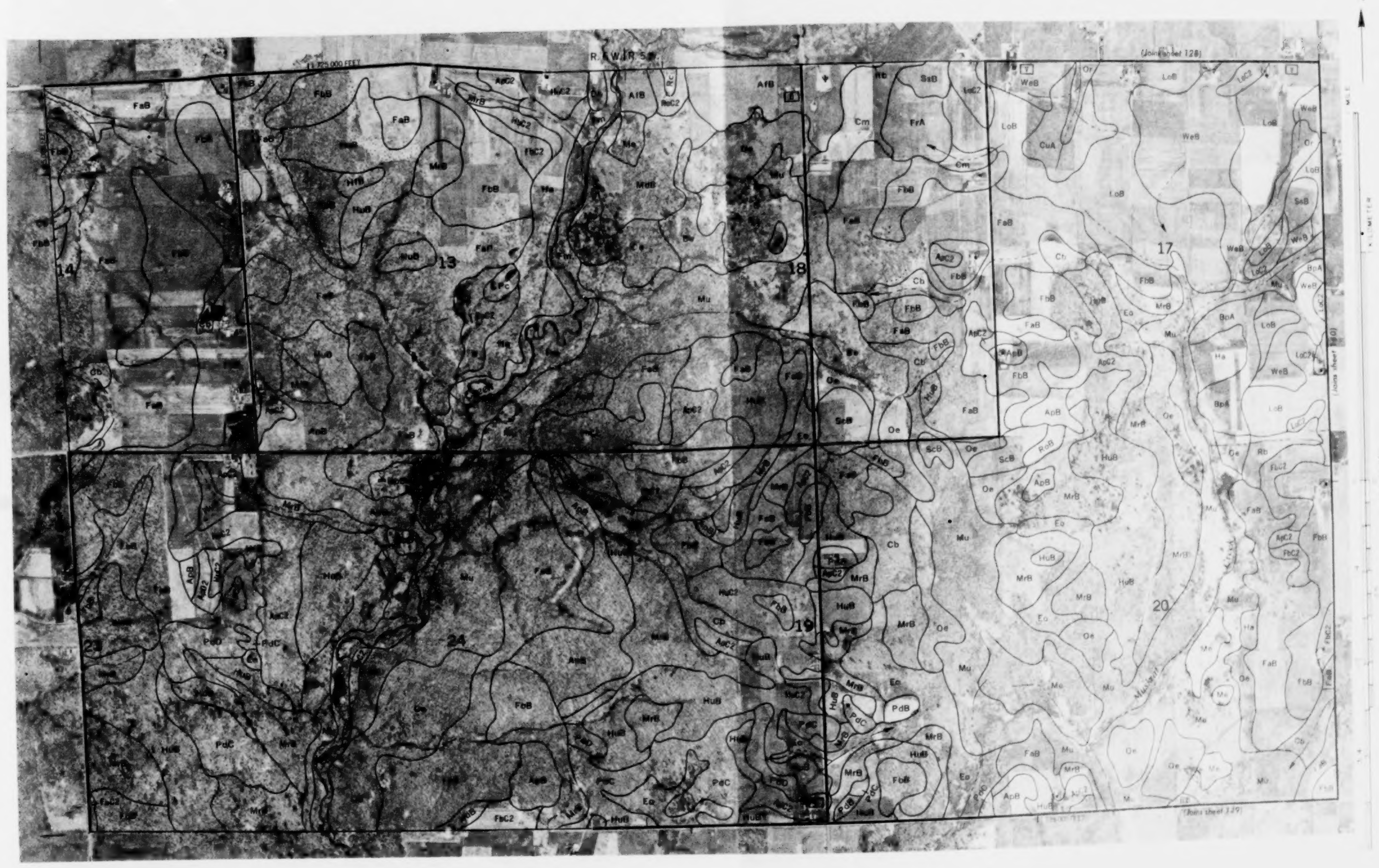
SOIL MAP OF CHIPPEWA COUNTY WISCONSIN — SHEET NUMBER 138


N
(Joins sheet 127)
17
16
15
20
21
22
23

SOIL MAP OF CHIPPEWA COUNTY WISCONSIN — SHEET NUMBER 139


R. 8 W. | R. 7 W.
(Joins sheet 128)
14
13
18
17
24
19
20

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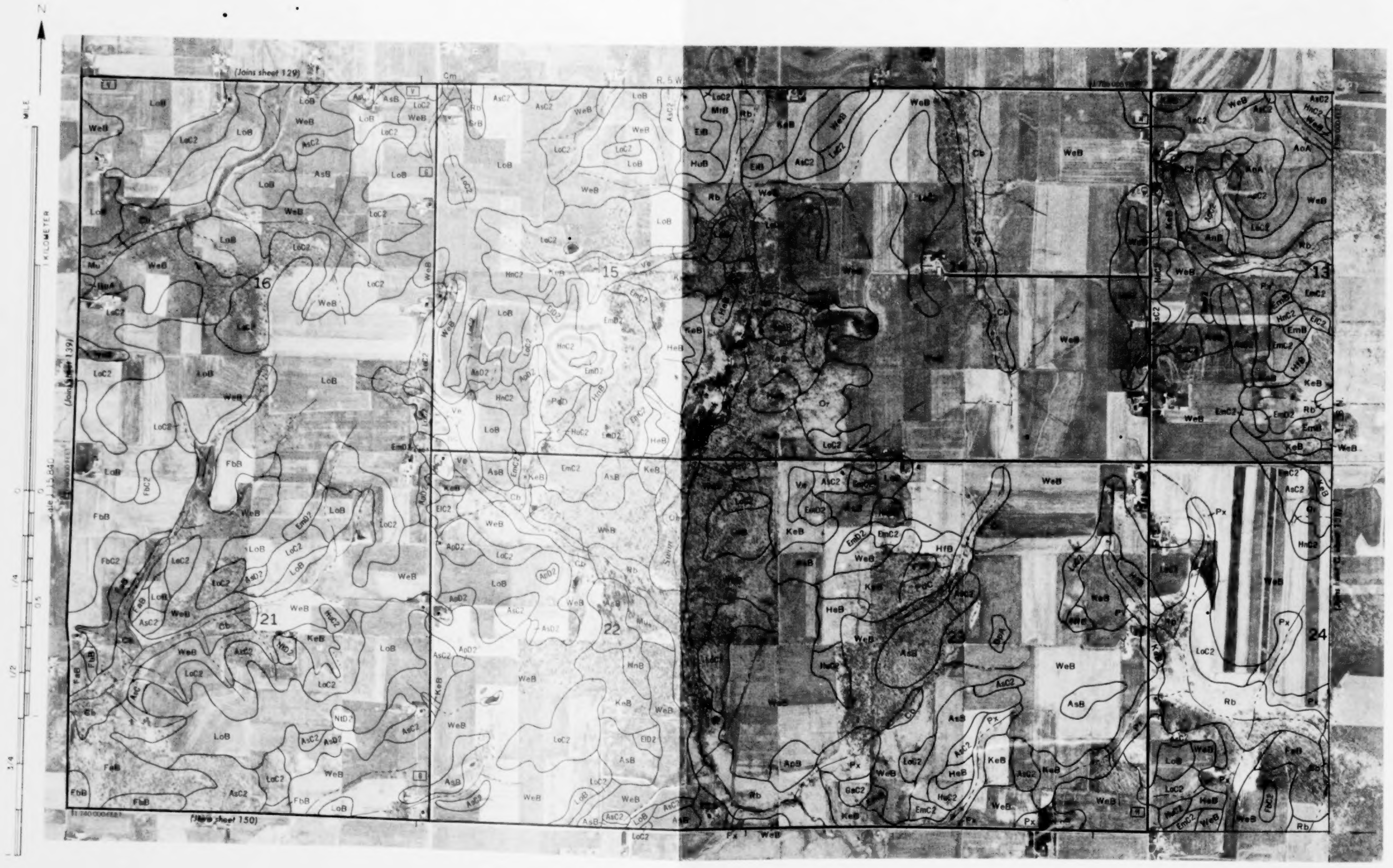
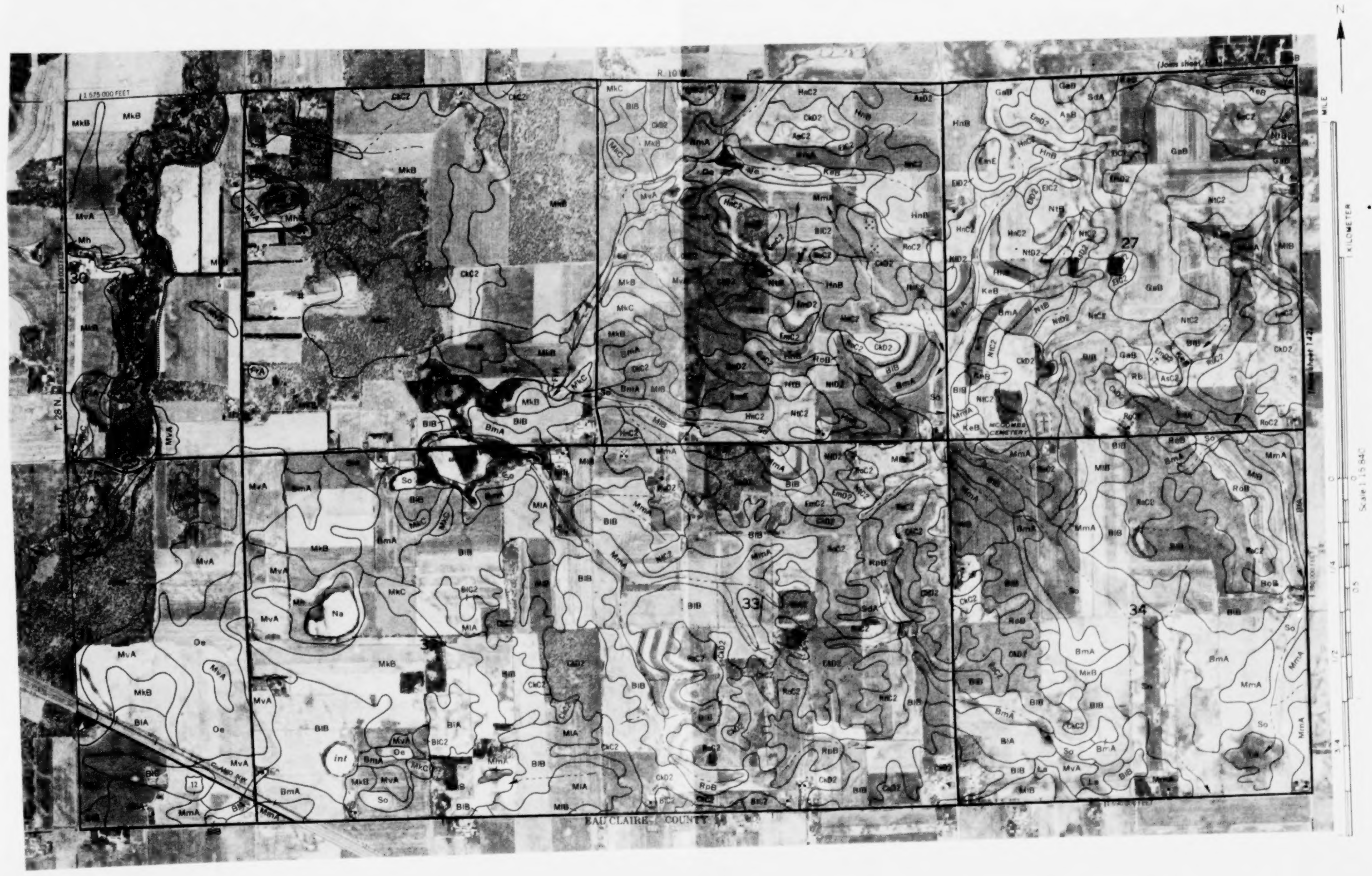
SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 140


N
(Joins sheet 129)
R. 5 W.
16
15
13
21
22
24
(Joins sheet 150)
MILE

SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 141


N
R. 10 W.
(Joins sheet
30
27
33
34
EAU CLAIRE COUNTY
MILE

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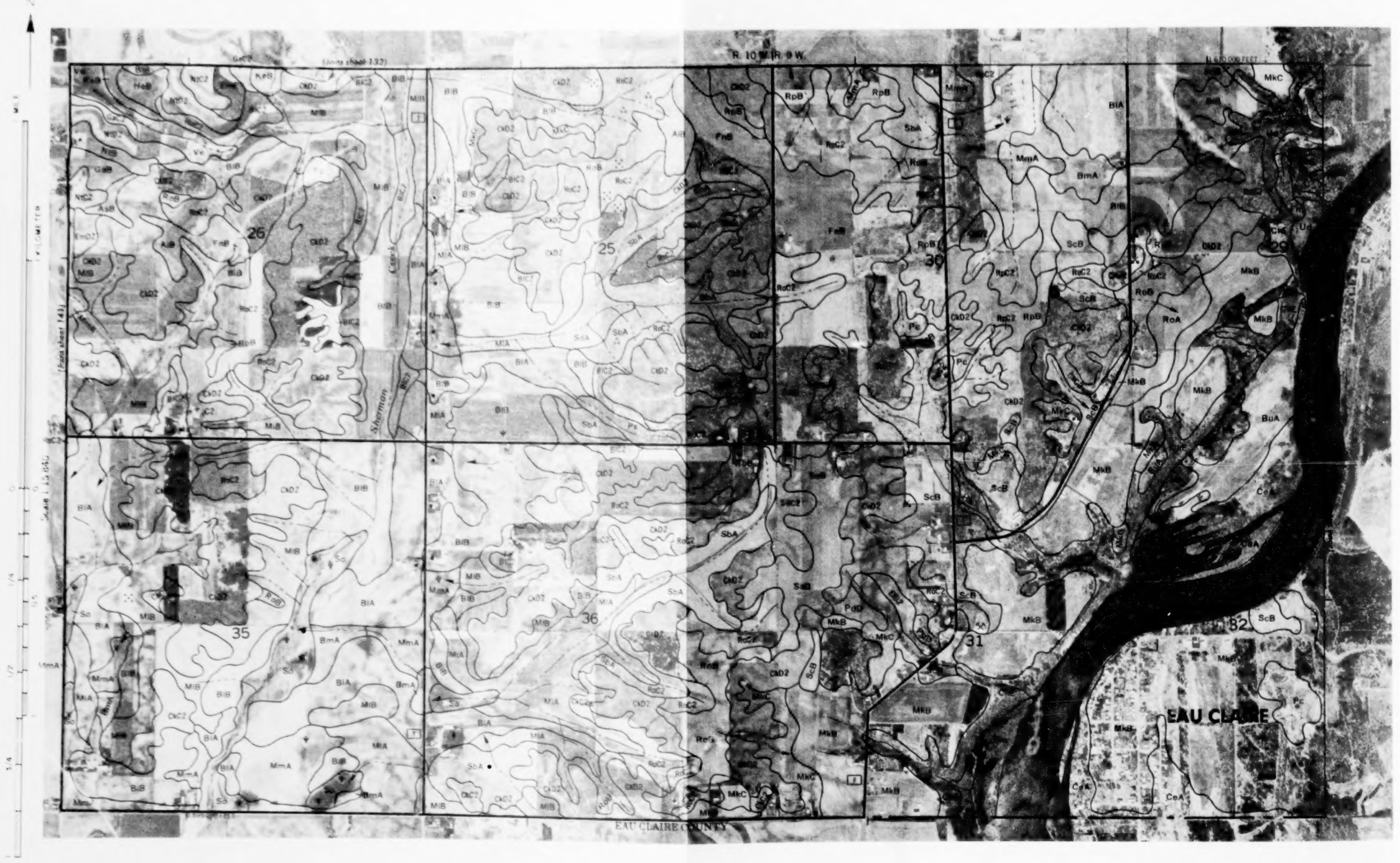
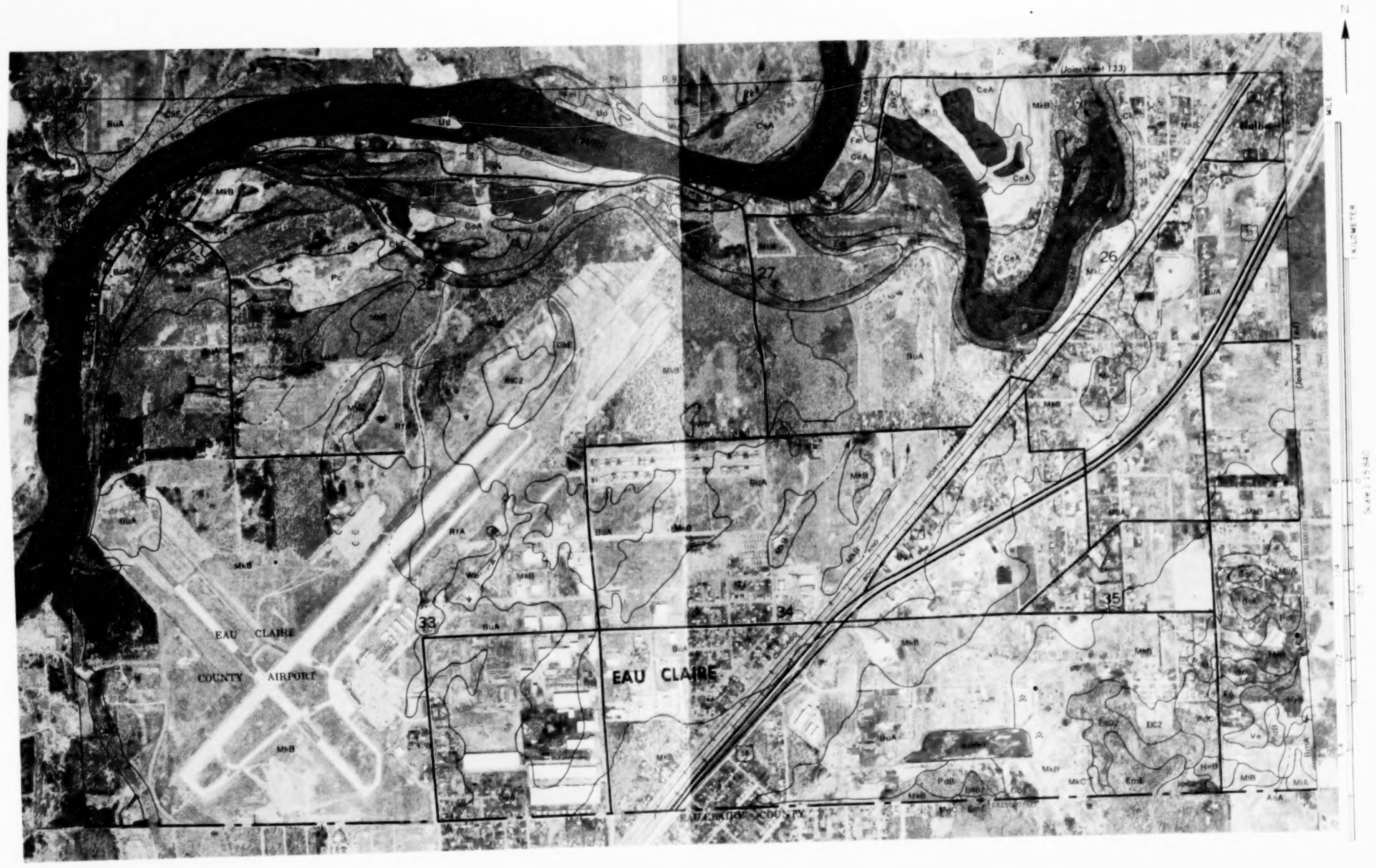
SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 142


N
(Joins sheet 137)
R. 10 W. | R. 9 W.
25
26
30
31
32
35
36
EAU CLAIRE
EAU CLAIRE COUNTY

SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 143


N
(Joins sheet 133)
26
27
33
34
35
EAU CLAIRE COUNTY AIRPORT
EAU CLAIRE

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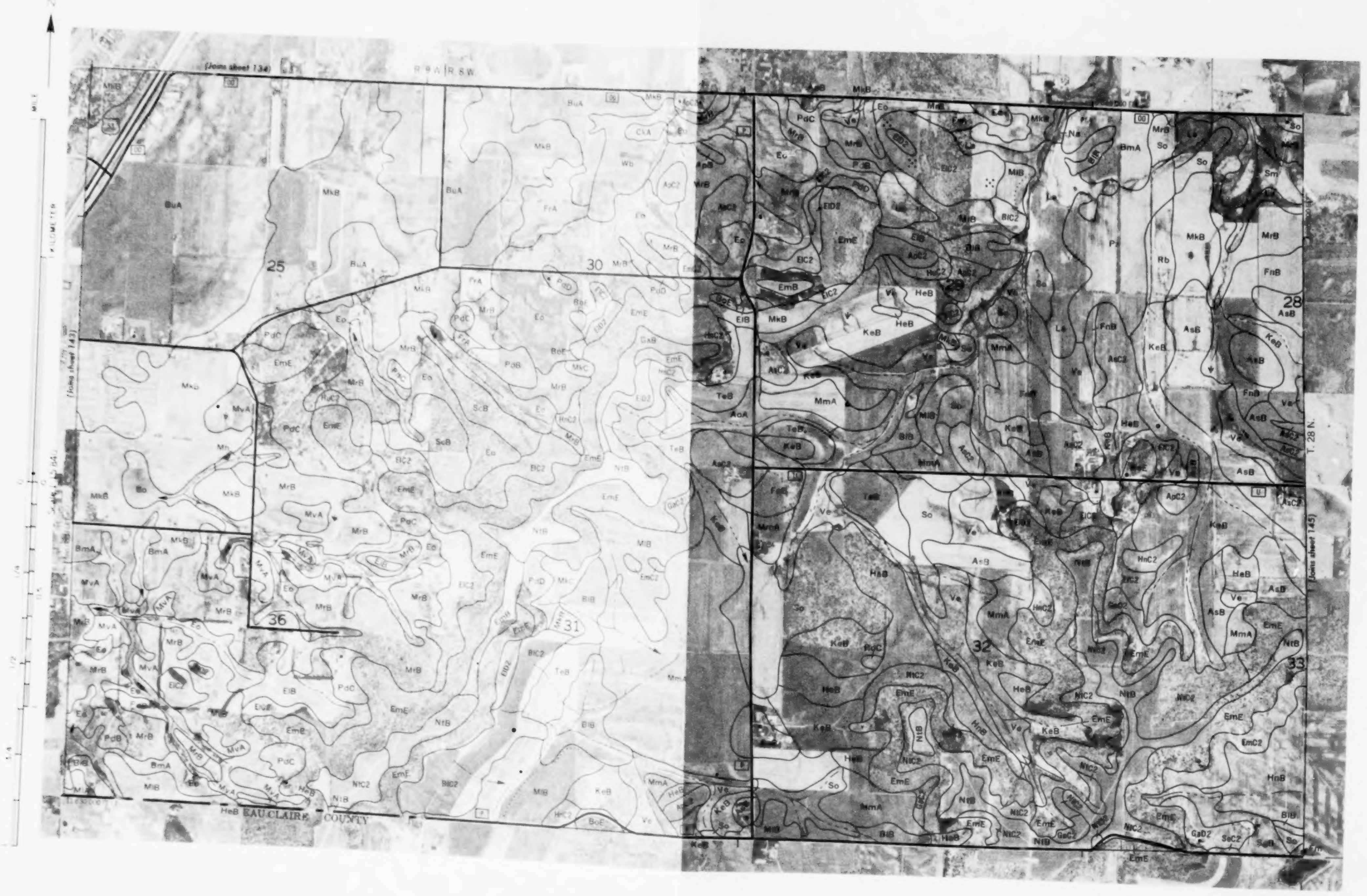
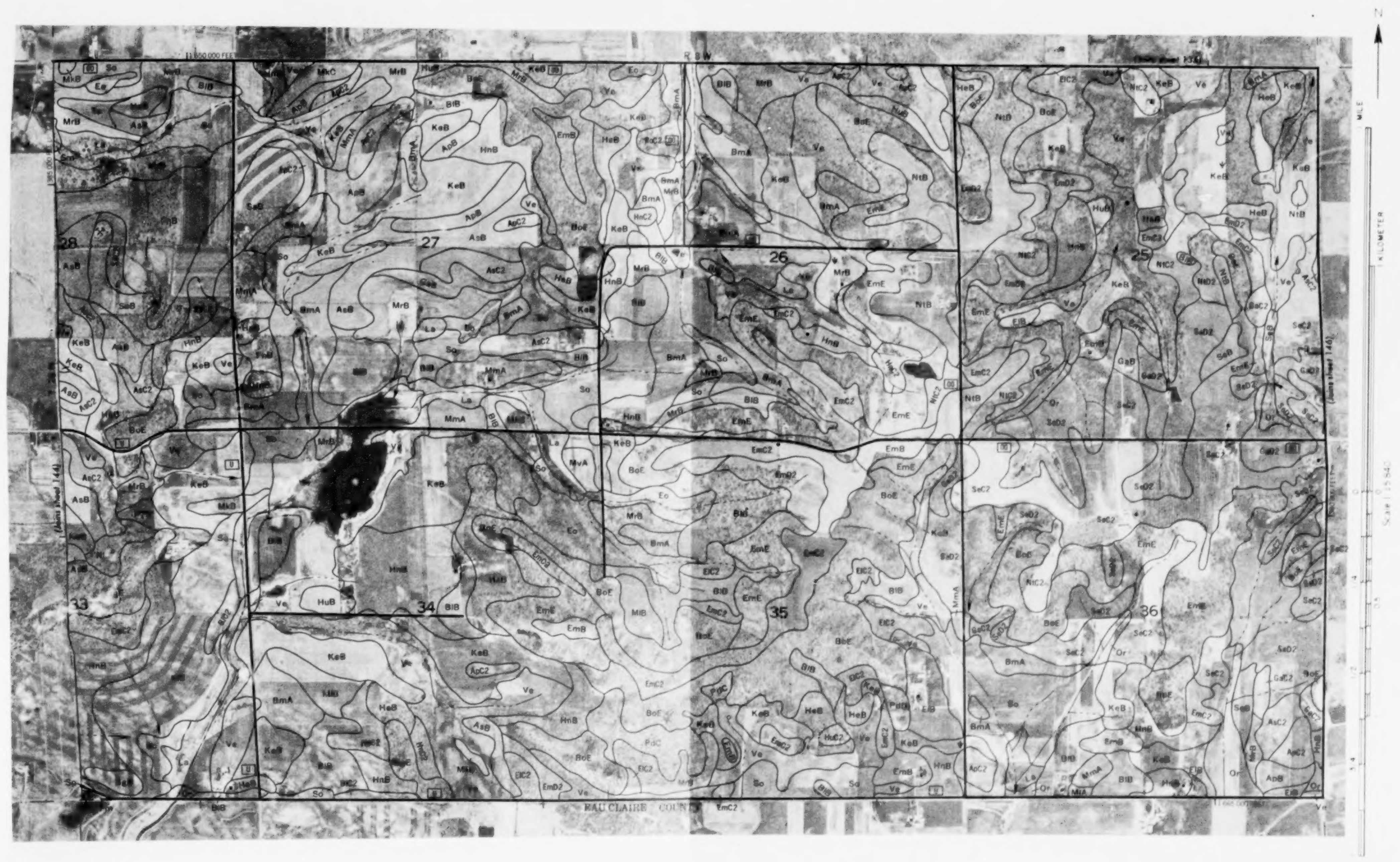
SOIL MAP OF CHIPPEWA COUNTY WISCONSIN — SHEET NUMBER 144


N
25
30
28
36
31
32
33
EAU CLAIRE COUNTY

SOIL MAP OF CHIPPEWA COUNTY WISCONSIN — SHEET NUMBER 145


N
28
27
26
25
33
34
35
36
EAU CLAIRE COUNTY

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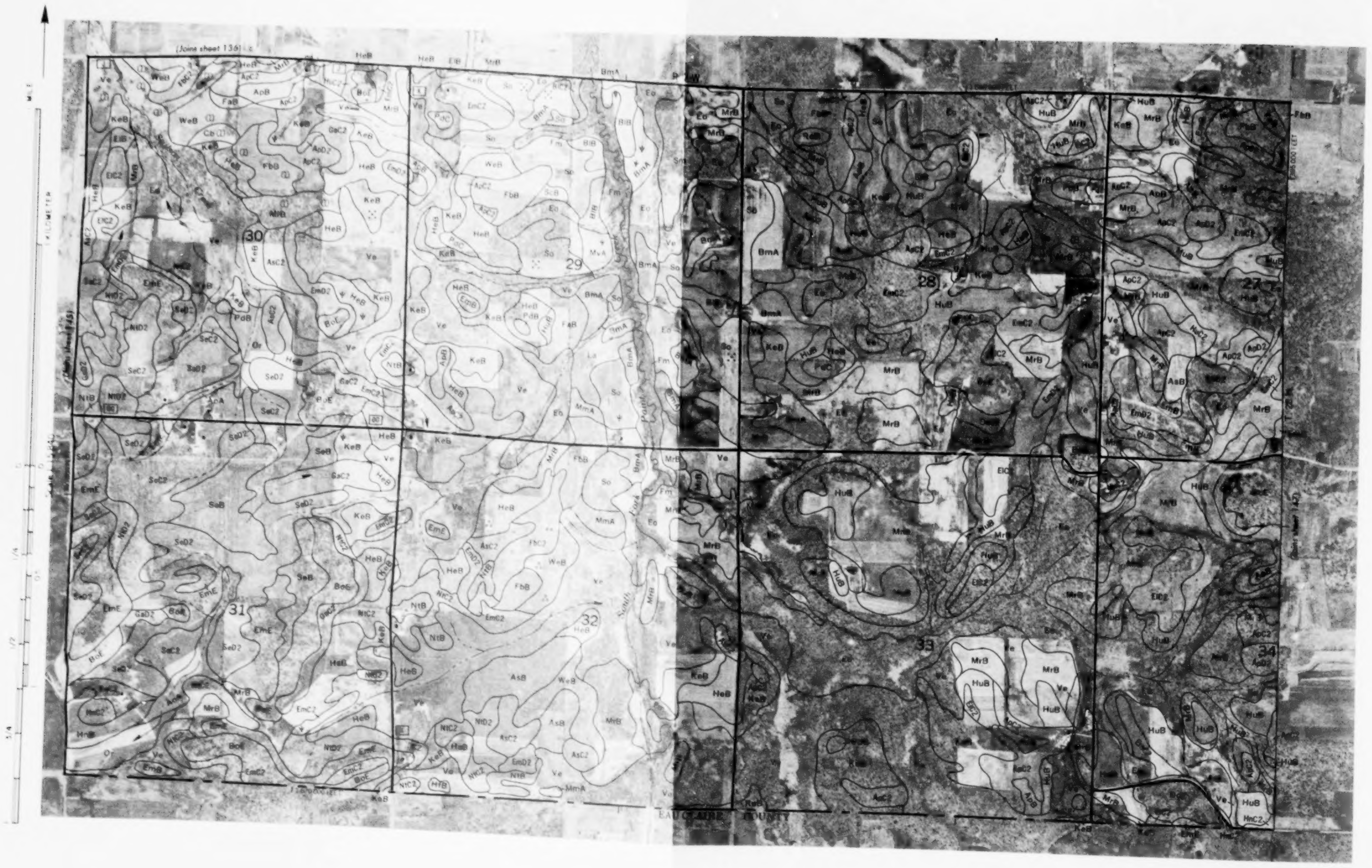
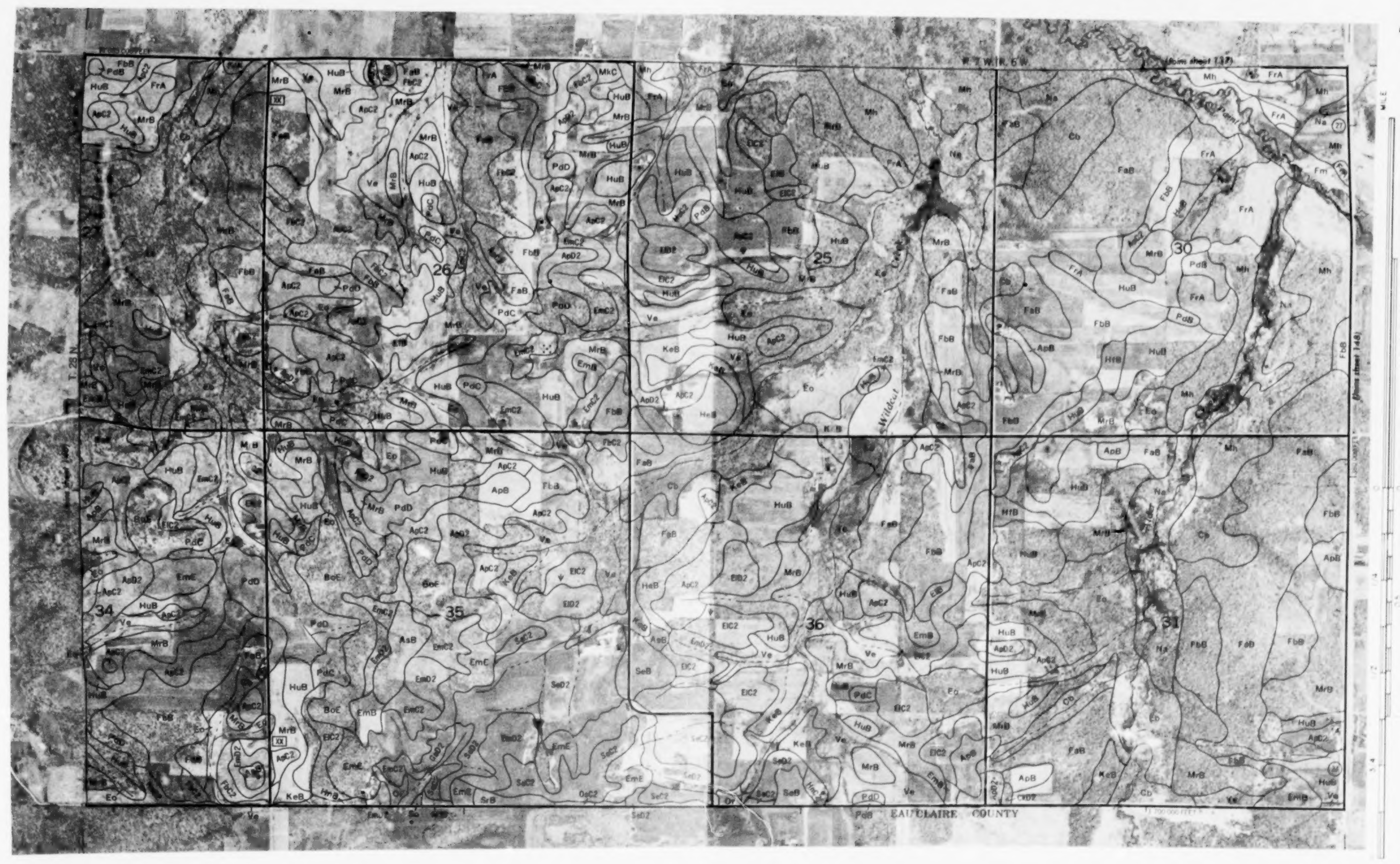
SOIL MAP OF CHIPPEWA COUNTY WISCONSIN — SHEET NUMBER 146


N
30
29
28
31
32
33
34
EAU CLAIRE COUNTY

SOIL MAP OF CHIPPEWA COUNTY WISCONSIN — SHEET NUMBER 147


26
25
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34
35
36
31
EAU CLAIRE COUNTY

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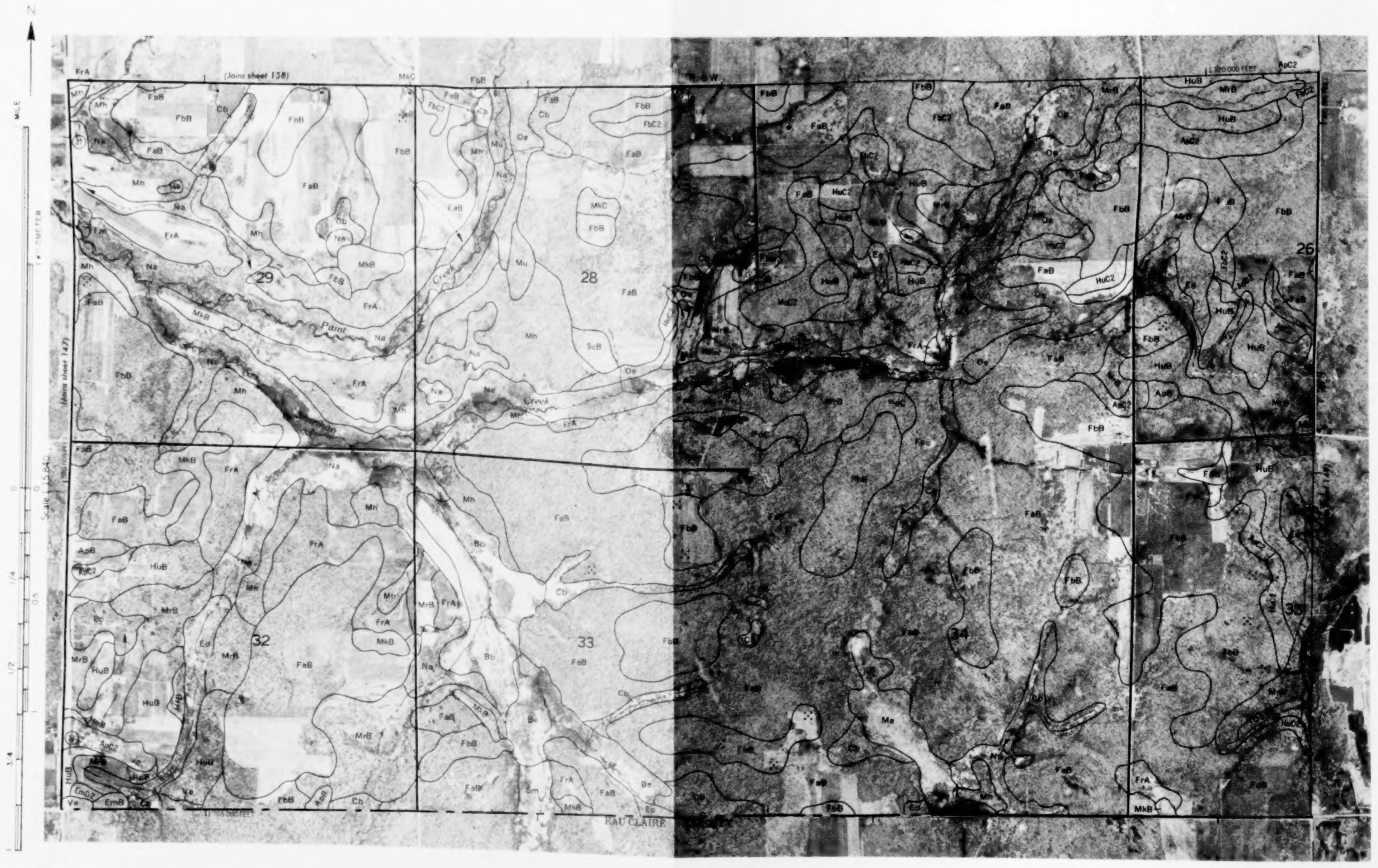
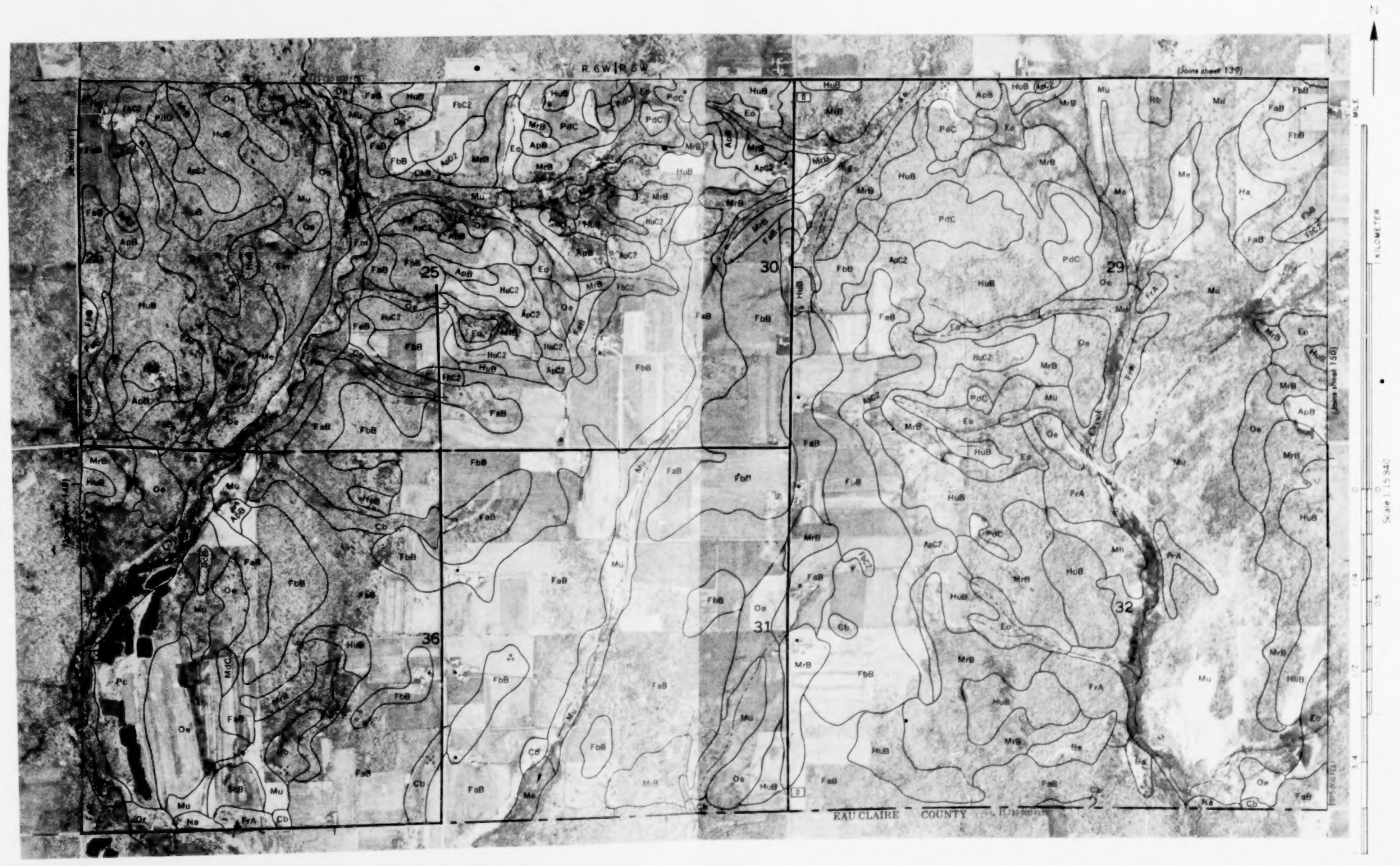
SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 148


29
28
32
33
EAU CLAIRE

SOIL MAP OF CHIPPEWA COUNTY, WISCONSIN — SHEET NUMBER 149


25
30
29
36
31
32
EAU CLAIRE COUNTY

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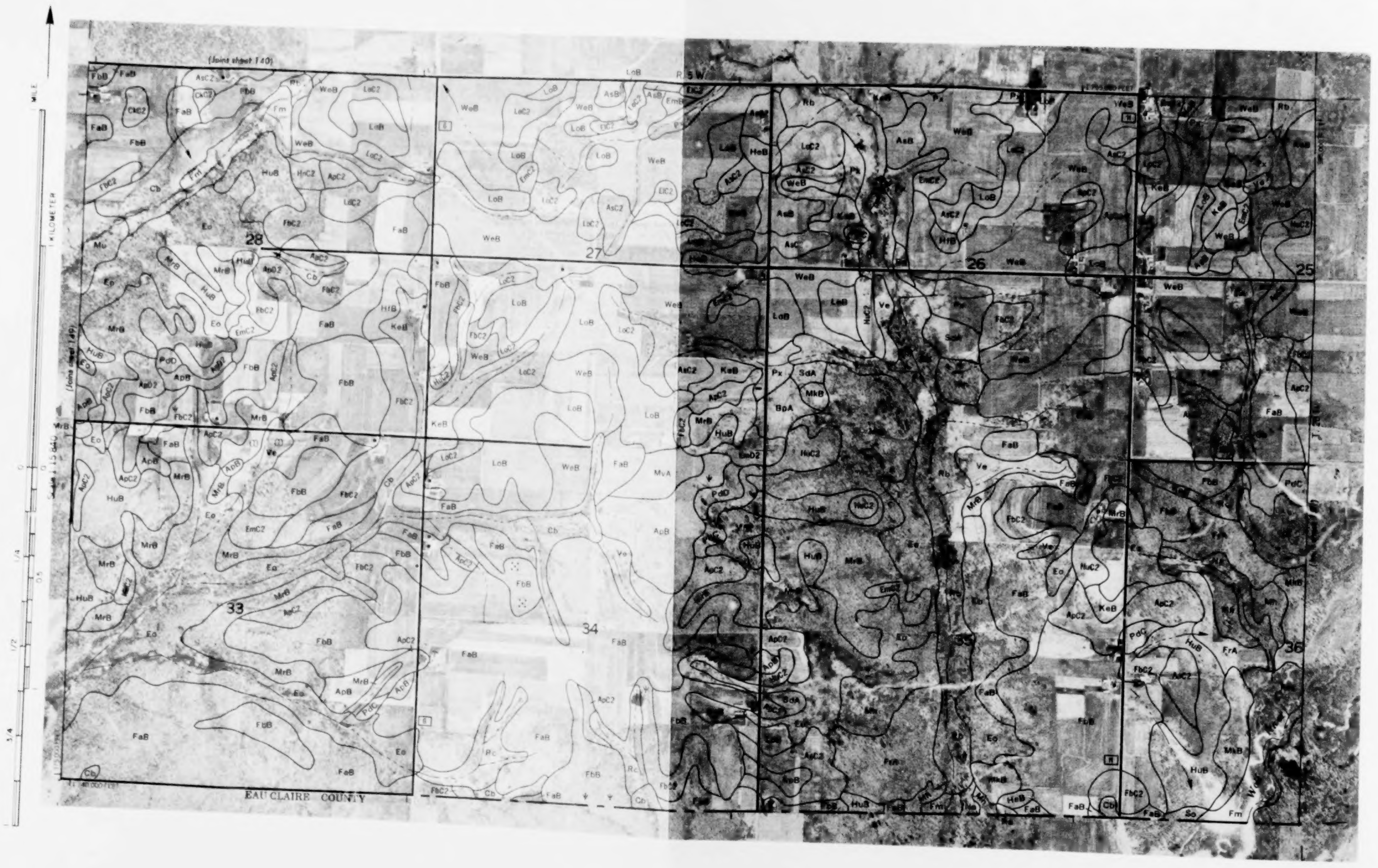
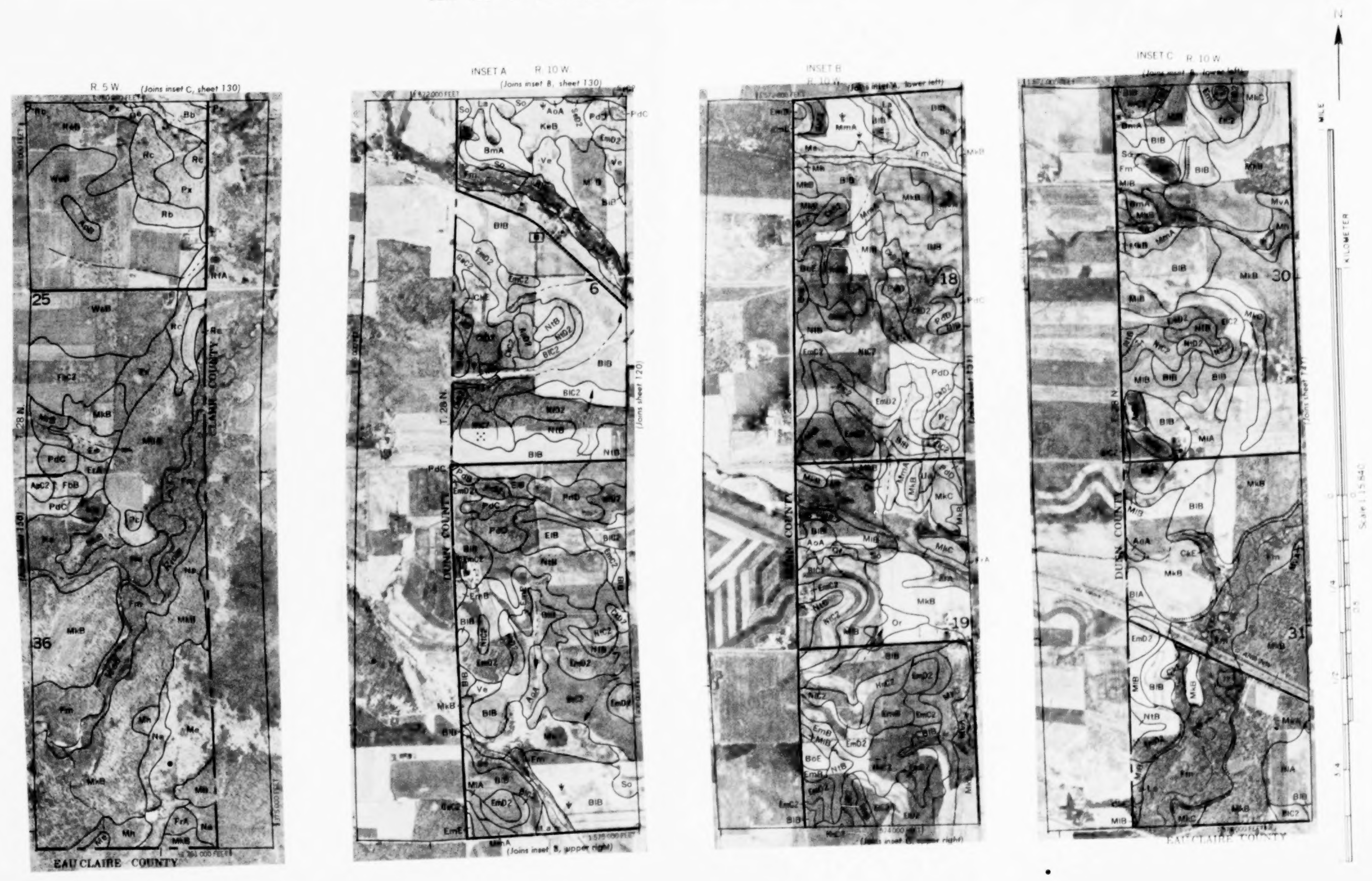
SOIL MAP OF CHIPPEWA COUNTY WISCONSIN — SHEET NUMBER 150


N
28
27
33
34
26
25
35
36
EAU CLAIRE COUNTY

SOIL MAP OF CHIPPEWA COUNTY WISCONSIN — SHEET NUMBER 151


R 9 W
INSET A
R 10 W
INSET B
INSET C
R 10 W
25
36
6
18
19
30
31
EAU CLAIRE COUNTY
N

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